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BADE (O.) & HOLTE (T.). **Kjemikaliebehandling av tremasse for å hindre soppskader. 2. Ved tilsetning i systemet.** [Chemical treatment of wood pulp to prevent fungal damage. 2. By addition to the system.]—*Norsk Skogind.*, 4, 2, pp. 29–34, 1950.

In further investigations in three Norwegian mills on the control of fungal damage in mechanical pulp [*R.A.M.*, 30, p. 336], three organic phenyl mercury compounds were added to the stuff chest or to the white water, viz., BSM–11B [see next abstract], pulpasan F, and scutamol, originating, respectively, in the United States, Sweden, and England. Promising results were obtained, though the elimination of *Penicillium roqueforti* presents considerable difficulty [loc. cit.]. Moreover, the high cost of the treatment will probably limit its utility to mills maintaining a high white water temperature (50° C. and upwards), which encourages the multiplication of mould spores and the consequent rapid development of unsightly spots.

APPLING (J. W.), BUCKMAN (S. J.), & CASH (C. D.). **Some further observations on Penicillium roqueforti Thom.**—*Tappi* (Tech. Ass. Pap. Pulp Ind.), 33, 7, pp. 346–349, 4 figs., 1950.

In the laboratory of the Scott Paper Company, Chester, Pennsylvania, of four lots of groundwood pulp treated at Hantsport, Nova Scotia, by the addition to each ton of wet pulp during production of 0·52, 0·73, 0·98, and 1·43 lb. BSM–11B (a 10 per cent. solution of phenyl mercuric acetate) [see preceding abstract], only the lot containing the minimum amount of the fungicide remained free from mould after enclosure in Mason jars from 8th April to 22nd September, 1949. Since *Penicillium roqueforti*, previously shown to be highly resistant to phenyl mercuric acetate [*R.A.M.*, 29, p. 446], was detected in the mouldy batches of treated pulp, it was suspected that biological competition between some organism producing a fungistatic substance and the mould might account for the anomaly of its absence from the pulp treated with the lowest concentration of the toxicant. Isolations from the latter confirmed the presence therein of a rod-shaped, chromogenic, Gram-negative, non-spore-forming bacterium, which proved markedly antagonistic to *P. roqueforti* under various conditions of growth.

ITÔ (K.). **Studies on 'murasaki-monpa' disease caused by Helicobasidium mompa Tanaka.**—*Bull. For. Exp. Sta. Tokyo* 43, 126 pp., 16 pl., 32 figs., 1 diag., 1949. [Japanese summary. Received April, 1951.]

This exhaustive, fully tabulated study, begun in 1942, on violet root rot (*Helicobasidium mompa*) [*R.A.M.*, 10, p. 24], one of the most important diseases in Japan, Formosa, Korea, and possibly China, comprises, *inter alia*, sections on its geographical distribution and host range (104 species in 76 genera of 45 families, including many economic plants, such as mulberry, apple, forest trees and ornamentals, sweet potato, soy-bean, and other vegetables, sugar-cane, cinnamon, and

ginger), symptomatology, cultural and morphological characters, physiology, and cytology of the fungus, the pathological anatomy and histology of affected plants, and an eight-page bibliography.

Sporophores of the fungus have been found on stones, dead branches, soil masses, and the concrete foundation of a house situated near diseased trees. *H. mompa* was isolated in pure culture for the first time by the author from a number of hosts. Good growth was made on decoctions of sweet potato, potato, and carrot, Waksman's and Czapek's media, and other substrata. Germination of the basidiospores occurs within a few hours, even in distilled water, at a temperature range of 17° to 35° C., with an optimum at 27°; none took place at 45°. The optimum pH for germination is about 6·2, and for mycelial growth between 5·2 and 6·4. The mycelium grows well between 20° and 29°, the minimum, optimum, and maximum being 8°, 27°, and 35°, respectively. Pigment production is most abundant at 29° to 35° on media containing calcium carbonate, peptone (0·5 per cent.), protein, sugar (e.g., 1 to 2 per cent. glucose), and alcohols (especially glycerol). Both young and old mycelia succumb to heating at 45° for 15 to 30 minutes and at 50° for five, but the former is killed by only 18 hours' exposure to —15°, whereas the latter withstands a period of 35 days at this temperature.

The slender roots of infected sweet potato plants rot and later become desiccated, while the large, fleshy ones are covered with reticulations of the rhizomorphs. In very severe infections, numerous pinhead sclerotia are frequently produced on the base of the stem near soil-level, while purplish-brown, white-edged, velvety mycelial mats, 300 to 500 sq. cm., develop on the ground surrounding the diseased plants. No hymenial layers were observed on these mats.

The slender roots of woody hosts, including *Robinia pseudo-acacia*, *Liriodendron tulipifera*, *Platycarya strobilacea*, *Acer campestre*, walnut (*Juglans sieboldiana*), *Paulownia tomentosa*, and elm (*Ulmus pumila*), turn yellowish- or blackish-brown, become softened, and decay away. In more severe cases the cambial region of the large roots is largely destroyed and numerous sclerotia are embedded in the cork layer. The development of adventitious roots may postpone the death of the affected trees. Soon after the purple rhizomorphs reach the base of the trunk they develop into mycelial mats or sporophores. The powdery, white hymenial layers are formed on the surface from May to July.

H. mompa usually enters the host through the sutures of cutinized or suberized tissues forming the so-called 'infection cushions', and proceeds intercellularly through the middle lamellae, secreting a dark-staining substance which accumulates in the cell cavities and intercellular spaces. The region of stained, thickened cell wall extends some way beyond the limit of fungal penetration and seems to act as a temporary barrier to further advance, which may, however, be forcibly effected by means of hyphal bundles. Numerous callosities are formed on the cutinized and suberized cell walls of sweet potato stems and fleshy roots, especially the latter, and completely arrest the further progress of the hyphae. The histological changes accompanying the invasion of sweet potato and soy-bean roots by *H. mompa* are fully described.

Staled culture filtrates of the fungus proved to be toxic to a number of plants, the foliage in particular sustaining severe damage. The toxic principle is thermostable and non-volatile.

The mature basidiospores of *H. mompa* are uniformly binucleate and the germtube cells multinucleate. The vegetative hyphae arising from the sclerotioid body, however, are usually binucleate, so that the multinucleate phase in the life-history of the fungus is very short. *H. mompa* is clearly distinguishable on cytological grounds from *H. purpureum*. In his discussion of the taxonomy of *H. mompa* (syn. *Stypinella mompa* and *Septobasidium mompa*), the author accepts Patouillard's diagnostic criterion of the presence of a probasidium in *Septobasidium* [ibid.,

18, p. 59] and its absence in *Helicobasidium* as a means of differentiation between the two genera.

FRIES (N.) & PANDERS (ANNA). **The growth-inhibiting effect of 5-amino-7-hydroxy-triazolopyrimidine in fungi and its reversal by purines.**—*Ark. Bot.*, 2nd Ser., 1, 5, pp. 437–444, 6 graphs, 1951.

In studies made at the Institute of Physiological Botany, University of Uppsala, the growth inhibiting effect of 5-amino-7-hydroxy-triazolopyrimidine (TAP) on *Ophiostoma multiannulatum* [*Ceratostomella multiannulata*: *R.A.M.*, 28, p. 535] and *Lentinus omphalodes* was approximately of the same order as that found earlier against bacteria by Roblin *et al.* (*J. Amer. chem. Soc.*, 67, p. 290, 1945). Very low concentrations, down to 1 μgm. per ml. suppressed the growth rate, but the highest concentrations, with *Ceratostomella* at least, failed to give complete inhibition. This was overcome, however, by smaller additions of adenine or guanine. A synergistic action between TAP and sulphanilamide was observed.

IWATA (Y.). **Studies on the modes of penetration of several peronosporaceous fungi on their hosts and other plants.**—*Ann. phytopath. Soc. Japan*, 12, 2–4, pp. 97–108, 6 figs., 1943. [Japanese, with English summary. Received November, 1950.]

In experiments in which eight species of *Peronospora* and three species of allied genera were used to inoculate the lower leaf surfaces of various hosts, penetration occurred mainly through the boundary lines between the epidermal cells and very rarely through their exposed surfaces or through the stomata [*R.A.M.*, 28, p. 234]. The points of penetration of *Brassica* spp. by *P. brassicae* [*P. parasitica*: ibid., 29, p. 71] were not affected by removing the wax from the leaf surface; those of the same species and *P. spinaciae* [*P. effusa*] appeared to be the same at all stages of maturity of the leaves. Penetration of *Hemistepta carthamoides* by *Bremia saussureae* also occurred mainly through the border of the epidermal cells although stomatal penetration was also fairly frequent. *Plasmopara viticola* on *Vitis thunbergii*, *P. nivea* on *Cryptotaenia japonica*, and *Pseudoperonospora humuli* on *Humulus japonica* penetrated only through the stomata.

BROADBENT (L.), GREGORY (P. H.), & TINSLEY (T. W.). **Roguing Potato crops for virus diseases.**—*Ann. appl. Biol.*, 37, 4, pp. 640–650, 1 graph, 1 diag., 1950.

In further investigations into the effect of roguing on the spread of virus diseases among potato plants [*R.A.M.*, 29, p. 247; 30, p. 186] the operation on plots of Majestic at Rothamsted Experimental Station, Harpenden, on 2nd July, 1947, failed to reduce the spread of leaf roll, but reduced rugose mosaic (potato virus Y) to about one-fifth of that in plots rogued on 21st July or left unrogued. Roguing Arran Pilot on 16th June or 2nd July reduced leaf roll to five-sixths of that in unrogued plots; roguing on 16th June reduced rugose mosaic to about half that in plots rogued on 2nd July and to about one-quarter of that in unrogued plots. Lifting Arran Pilot in mid-August reduced virus diseases to about two-thirds of the amount present in those lifted 30th September. The effect of roguing in the 1947 experiments on both varieties was to reduce the percentage of plants affected by rugose mosaic with increasing distance from the source of infection; roguing had little effect on leaf roll.

In 1948 Majestic and King Edward potatoes at Rothamsted, Sutton Bonington (Nottinghamshire), and Bretton (Derbyshire), were rogued from 22nd to 24th June and tubers lifted from 28th to 30th July and again at the close of the season. Leaf roll spread more in Majestic than in King Edward, and rugose mosaic more in King Edward. At Rothamsted roguing reduced the spread of both by about

one-fifth; at Sutton Bonington it had no effect; and at Bretton it had no effect on leaf roll, but prevented the spread of rugose mosaic.

Roguing in the ware-growing areas of southern and south-eastern England is not considered to be an economic practice.

Bercks (R.). **Die Bedeutung der Serologie für Erforschung und Bekämpfung der Kartoffelviren.** [The importance of serology for the study and control of Potato viruses.]—*NachrBl. dtsch. PflSchDienst* (*Braunschw.*), 2, 1, pp. 6–8, 3 figs., 1950.

The most effective methods for the isolation of a pure serum and the preparation of plant juice for testing for the presence of potato viruses are described in connexion with a general discussion on the application of serology to their study and control [*R.A.M.*, 29, pp. 377, 378].

Boyd (A. E. W.). **Susceptibility of Solanum curtilobum to Spongospora subterranea (Wallr.) Johnson.**—*Nature, Lond.*, 167, 4245, p. 412, 1951.

During 1948 and 1950 several lines of *Solanum curtilobum* [*R.A.M.*, 28, p. 305], reputed to be immune from powdery scab (*Spongospora subterranea*), were tested at the Plant Pathology Laboratory, Edinburgh, together with several other commercial potato varieties. In 1948 two plants of one line (Commonwealth Potato Collection No. 2192) of *S. curtilobum* were planted in pots of sterilized soil inoculated with spore balls of the fungus from several infected tubers and treated with sufficient shell lime to bring the soil pH to 7·2, since this has been found to produce excellent infection of susceptible varieties. The soil was maintained at a moisture content of about 85 per cent. of its field capacity. On one plant only a few small tubers were produced, all of which were free from infection. The roots and stolons of the other plant, however, lifted at an earlier stage, showed numerous nodules of proliferated tissue bearing masses of spore balls of *S. subterranea* in many stages of development. In parallel tests the variety Epicure bore, on an average, 23 pustules per tuber.

In 1950 the lines CPC. 221, 247, and 2191 of *S. curtilobum* were tested as well as 2192. Conditions were not ideal for infection and the tubers of the Epicure control plants were only slightly attacked. No pustules were observed on any of the *S. curtilobum* tubers, although nodules bearing spore balls of the fungus were again observed on the stolons of 2191 and 2192. It would be unusual to find tuber immunity associated with stolon susceptibility, and it is concluded, therefore, that some lines of *S. curtilobum* are susceptible to powdery scab.

Rudd Jones (D.) & Dowson (W. J.). **On the bacteria responsible for soft rot in stored Potatoes, and the reaction of the tuber to invasion by Bacterium carotovorum (Jones) Lehmann & Neumann.**—*Ann. appl. Biol.*, 37, 4, pp. 563–569, 1 pl., 3 figs., 1950.

Of 25 isolates of soft rot bacteria from potatoes with symptoms of bacterial rot collected from all parts of England between October, 1945, and June, 1947, 23 were *Bacterium carotovorum* [*Erwinia carotovora*: cf. *R.A.M.*, 29, pp. 85, 497, 502, *et passim*] and two were *Pseudomonas syringae*, not previously recorded as causing a rot of stored potatoes. All produced extensive rotting when inoculated into healthy tubers, from which they were later re-isolated.

Species of *Clostridium*, generally associated with *E. carotovora*, were isolated from a type of rot which was distended with gas or of a ropy consistency and often pink. One *C.* species when inoculated with *E. carotovora* into healthy tubers caused a gassy, pink rot.

When infected by *E. carotovora* King Edward, Majestic, and Arran Banner tubers formed a barrier of suberized cells, the size and effectiveness of which depended

on temperature and relative humidity [ibid., 30, p. 243]. Low temperatures (5° to 10° C.) and a low humidity (86 per cent.) favoured formation of the barrier and eventually of periderm, while high temperatures (20° to 25°) favoured the multiplication of the bacteria, whose advance was limited by humidities below saturation. Fluctuations of temperature or humidity may promote the formation of a succession of barriers.

Adair (C. R.) & Cralley (E. M.). **1949 Rice yield and disease control tests.**—*Rep. Ser. Ark. agric. Exp. Sta.* 15, 20 pp., 1950.

Experiments were conducted in the greenhouse at Fayetteville, at the Rice Branch Experiment Station at Stuttgart, and in fields in Clay, Craighead, Poinsett, Monroe, Lonoke, and Drew counties to test the reaction of 18 rice varieties grown in Arkansas to the principal diseases. No variety was highly resistant to stem rot (*Leptosphaeria salvinii*) [*R.A.M.*, 22, p. 451; 29, p. 431], but Caloro, Asahi, Zenith, Arkrose, Magnolia, Supreme Blue Rose, Kamrose, Blue Rose 41, Lady Wright, and Hill Long Grain were moderately resistant. Potassium applications tended to decrease susceptibility. Hill Long Grain was resistant to narrow brown leaf spot (*Cercospora oryzae*) [ibid., 26, p. 261], and Asahi and Kamrose were resistant to all the strains occurring in the State. All the principal commercial varieties were susceptible to brown spot (*Helminthosporium oryzae*) [*Ophiobolus miyabeanus*: ibid., 29, p. 381]. Seed treatment is recommended as a general practice; for the control of the seedling blight phase of *O. miyabeanus* in stands of drilled rice arasan or ceresan M should be used, and yellow cuprocide for seed sown in water.

Zenith, Arkansas Fortuna, Nira 43, and Lady Wright were resistant to blast (*Piricularia oryzae*) [ibid., 21, p. 502]. Black sheath rot (*Ophiobolus oryzinus*) [ibid., 27, p. 335] caused considerable damage in test plots in Drew county.

Kitani (K.). **On a bacterium associated with the Rice blast disease.**—*Ann. phytopath. Soc. Japan*, 11, 3, pp. 136–146, 1 fig., 1941. [Japanese, with English summary. Received November, 1950.]

A yellow, aerobic, Gram-positive bacterium, with rods 2 to 2·4 by 0·5 to 0·7 μ, and peritrichous flagella, and assigned the group number 211,2222532, was often associated with the causal fungus in lesions of the rice blast disease [*Piricularia oryzae*: *R.A.M.*, 30, p. 190]. The optimum, maximum, and minimum temperatures for the bacterium were 28° to 30° C., above 40°, and 10° to 16°, respectively. Although its co-existence with *P. oryzae* tended to reduce the occurrence of the disease on rice seedlings and inhibit conidial germination it appeared to have little effect on the enlargement of the leaf spots.

Ito (T.). **A comparative study on the pathogenicity of some species of Saprolegniaceae and Pythium on Rice seedlings.**—*Ann. phytopath. Soc. Japan*, 12, 2–4, pp. 109–115, 2 figs., 1943. [Japanese, with English summary. Received November, 1950.]

In investigations on rot disease of rice seedlings in nursery beds [*R.A.M.*, 27, p. 446], 16 aquatic fungi were isolated from water in Kyoto and inoculated on to rice seeds grown at temperatures from 6° to 39° C. on a 2 per cent. agar medium containing Sach's solution or on sterilized field soil covered with water. *Pythium aphanidermatum* and *P. helicum* S. Ito [described as a new species in 1942] showed very strong pathogenicity, while that of the seven other *P.* spp. appeared to be moderate. It was suggested that the Saprolegniaceae [ibid., 11, p. 397] tested, which were very weakly pathogenic, might prove more destructive if the seedlings were grown at lower temperatures. It is concluded that rot disease of rice seedlings is due principally to *Pythium* species.

HEMMI (T.) & AOYAGI (Z.). **Ecological studies on important fungi pathogenic to the crops in the Far East. I. Germination of the macroconidia of Gibberella fujikuroi in relation to some environmental factors.**—*Ann. phytopath. Soc. Japan*, 11, 2, pp. 66–80, 1941. [Japanese, with English summary. Received July, 1950.]

Experiments carried out in Japan showed that the optimum temperature for the germination of the macroconidia of *Gibberella fujikuroi* causing 'bakanae' [elongation] disease of rice seedlings [*R.A.M.*, 30, p. 240 and next abstract] was 28° to 30° C., the maximum being above 44° and the minimum below 8° [ibid., 15, p. 173]. The germination rate of macroconidia on slides in a saturated atmosphere at 28° averaged 45·5 per cent., but was slight at 97·5 per cent. humidity. The presence of a thin film of water was found to be necessary for germination. The percentage germination and germ tube length were greater in the absence of light. Culture filtrates of *Ophiobolus miyabeanus* and *Piricularia oryzae* accelerated germination of *G. fujikuroi* more than its own filtrates.

YOSHII (H.). **Comparison of the reactions of Rice and Wheat seedlings to infection of the causal fungus of the 'bakanae' disease and to filtrates of its cultures.**—*Ann. phytopath. Soc. Japan*, 12, 2–4, pp. 85–96, 3 figs., 1 graph, 1943. [Japanese, with English summary. Received November, 1950.]

Both the pathogenicity and virulence of the fungus causing 'bakanae' [elongation] disease of rice seedlings [*Gibberella fujikuroi*: see preceding abstract], the term virulence being used to designate the occurrence of overgrowth in culture filtrates of the fungus in the absence of the organism, differ in their extent according to the strains present [*R.A.M.*, 22, p. 451; 25, p. 357]. Each strain, however, tends to exert the same degree of virulence and pathogenicity. This tendency was also observed in repeated experiments with wheat seedlings.

FUKUSHIMA (S.). **On the effect of copper sulphate upon the susceptibility of the Rice plant to the Helminthosporium disease.**—*Ann. phytopath. Soc. Japan*, 11, 4, pp. 162–171, 1942. [Japanese, with English summary. Received November, 1950.]

In solution-culture experiments the susceptibility of rice plants to *Ophiobolus miyabeanus* [*R.A.M.*, 30, p. 74] tended to decrease in inverse proportion to the amount of copper sulphate added (1:1,000,000 to 1:100,000 mol.). In pot experiments the number of diseased spots per unit area of leaf was always less on seedlings grown in soil containing copper sulphate than in the controls.

YOUNG (H. E.). **Oidium leaf disease.**—*Adv. Circ. Rubb. Res. Scheme Ceylon* 28, 6 pp., 1950.

In this circular, which revises and brings up to date No. 22 [cf. *R.A.M.*, 24, p. 204; 25, p. 183], it is stated that mildew damage (*Oidium heveae*) [ibid., 30, p. 191] to rubber was particularly severe during the refoliation season of 1949 to 1950 in Ceylon, and was fairly general in all districts, even the low-country rubber receiving a serious setback.

A normal, minimum dose of 10 to 12 lb. sulphur per acre per round is recommended for adequate control in both low- and mid-country elevations, even if a light attack only is experienced. Dusting should commence when defoliation of the old leaves begins before the new buds break, and should be carried out to a fixed schedule every seven to ten days until refoliation is complete. *O. heveae* is found on the common weed *Euphorbia pilulifera*, where it probably survives between seasons.

Pfältzer (A.). **Advies inzake bestrijding van witte wortelschimmelaantasting (Fomes lignosus, syn. Rigidoporus microporus) in Hevea-aanplantingen.** [Advice on the control of white root rot (*Fomes lignosus*, syn. *Rigidoporus microporus*) in Rubber plantations.]—*Bergcultures*, 19, 11, pp. 219, 221, 223, 225, 227, 229, 1950.

This is a useful summary and explanatory discussion of the recommendations that have been published from time to time for the control of white root rot (*Fomes lignosus*) in Indonesian rubber plantations (gardens and clearings) [*R.A.M.*, 18, p. 728; 23, p. 289; 28, p. 240, *et passim*].

Nutman (F. J.). **Studies of the Clove tree. III. The effect of the sudden-death disease on water relations.**—*Ann. appl. Biol.*, 37, 4, pp. 584–590, 1 graph, 1950.

Further studies on sudden death of cloves in Zanzibar [*R.A.M.*, 29, p. 277; 30, pp. 122, 141] showed that extensive root disorganization is associated with every recognizable stage of the disease. In the early stages, however, the water status of an affected tree is more favourable than that of a healthy one, but the transpiration power and the assimilation rate are much reduced [loc. cit.]. The results of these physiological studies are considered to support the view that the disease is due to a pathogen. If the root disorganization were due to direct attack by a pathogen the water strain would increase progressively from an early stage and under no circumstances could a more favourable water-balance result; but in sudden death the increased strain does not become apparent until just before the final wilting begins. This would be explained were the causal agent a toxin-producing fungus or a virus.

Winters (H. F.). **Cinchona propagation.**—*Bull. P.R. fed. agric. Exp. Sta.* 47, 26 pp., 9 figs., 1950.

In the section on diseases (pp. 20–22) [cf. *R.A.M.*, 30, p. 193] it is stated that the stem blight of nursery *Cinchona ledgeriana* and *C. succirubra* occurring in Puerto Rico appears to be the same *Phytophthora* disease as that reported on plantation trees in Central and South America [*P.* (?) *parasitica*: ibid., 24, p. 289]. The same organism may be the cause of tip blight manifested by the wilting of the foliage during the warmest part of the day. Associated with it is a canker running from the root zone part of the way up the stem. Usually one or more of the large roots is killed. The plants may appear to recover from the disease although the root systems are never well developed.

Another prevalent disease of the seedlings in Puerto Rico is a root and collar rot with symptoms somewhat similar to the disease caused by *P. quininea* in Peru [ibid., 26, p. 467]. The leaves turn red followed by the wilting and shedding of all but the terminal ones. The collar region is usually swollen above the dead root system. Plants in this condition may remain alive for several months, often producing new roots from the collar region.

Another unknown root disease which has been troublesome in permanent plantings causes symptoms similar to those of the grey root fungus (*Rosellinia* sp.) in Java *Cinchona* plantings. The trees appeared healthy but made poor growth, the leaves wilted suddenly and dried out, and the main roots were rotted.

Control measures comprise rigid sanitation practices in nurseries and fields, the burning of all diseased material, and good soil drainage in the nursery. Drainage may be improved by raising nursery beds 6 to 12 in. above the ground. In a replicated experiment using five soil fumigants only chloropicrin and DD at the rate of 300 lb. per acre significantly reduced the number of diseased plants in nursery beds. Soil injections with 2 ml. of both materials were made 8 in. apart, the soil was sprinkled with water and covered with wax paper for one week, and finally exposed to the air for two weeks before planting.

MALAGUTI (G.). **Phytophthora blight of Safflower.**—*Phytopathology*, 40, 12, pp. 1154–1156, 1950.

From its morphological and cultural characters and temperature relations the *Phytophthora* isolated from blighted safflower plants of the Spiny and Spineless varieties (seed of which was obtained from Nebraska) growing in experimental plots at Maracay, Venezuela, was identified as *P. palmivora*. A survey of the relevant literature revealed no record of a similar blight of safflower plants, though the fungus has been observed on seedlings of the same host in India (*Curr. Sci.*, 16, pp. 291–292,1947), and a root rot is reported from the United States [*P. drechsleri*: *R.A.M.*, 30, p. 245].

During the dry season (February) of 1949, the principal diagnostic symptoms were a rapidly progressing, permanent colour change in the leaves from dark to pale green, followed in five to eight days by death of the plants. A blackish-brown discoloration, turning reddish-brown on drying, occurred on the lower stem area, extending a little way downwards and 15 to 20 cm. upwards from soil-level. The roots were seldom infected. The Spiny variety was the more susceptible.

In the rainy season (June) all parts of the plants were attacked at every stage of growth. A girdling infection at the watersoaked, discoloured stem base killed seedlings and young plants. A canker 5 to 15 mm. long caused the collapse of the stem. In older plants the collar rot colour was somewhat darker than in the dry season. A soft, watersoaked, blackish-brown decay finally spread through all tissues of the invaded roots.

WATANABE (K.). **Leaf blotch of Sesame.**—*Ann. phytopath. Soc. Japan*, 11, 2, pp. 57–65, 3 figs., 1941. [Japanese, with English summary. Received July, 1950.]

Leaf blotch of sesame (*Sesamum orientale*) caused by *Helminthosporium sesami* [*R.A.M.*, 20, p. 424] affects the leaves, petioles, stems, and pods of seedling plants. The conidiophores measure 105 to 337·5 (average 194) μ long by 5 to 10 (average 7·11) μ wide, with 2 to 9 septa, and the conidia 27·5 to 267·5 (average 102·9) μ by 5 to 17·5 (average 15·03) μ, with 3 to 20 septa (average 8·77). The fungus grew readily on various media at an optimum temperature of between 27° and 30° C. at pH 6·2. In culture the conidia measured on an average 100·2 by 10·66 μ at 23° and 88·7 by 10·46 μ at 37°. Pathogenicity to sesame was demonstrated in inoculation experiments. Hot water treatment has proved effective in disinfecting contaminated seed.

MATSUMOTO (T.). **An annotated list of Sugarcane diseases in Formosa and remarks on the taxonomy of the causal organisms. II.**—*Mem. Fac. Agric. Taiwan*, 2, 2, pp. 1–5, 1950.

Continuing his enumeration of the sugar-cane pathogens of Formosa [*R.A.M.*, 28, p. 142], the author gives descriptive notes on the diseases comprised in four further sections of his key. To section II, with lesions predominantly on the leaf sheaths, belong red spot (*Cercospora vaginae*) [ibid., 29, p. 435], red rot (*Sclerotium rolfsii*) [loc. cit.], and *Cytospora* sheath rot (*C. sacchari*) [loc. cit.]. In section III, involving the cane top, are included smut (*Ustilago scitaminea*), pokkah boeng (*Gibberella fujikuroi* var. *subglutinans*) [loc. cit.], and tangle top (of mechanical origin). The diseases of section IV, characterized predominantly by stalk lesions, are rind disease (*Pleocyta sacchari*), red rot (*Physalospora tucumanensis*) [loc. cit.], *Schizophyllum* rot (*S. commune*), pineapple disease (*Ceratostomella paradoxa*), stem red stripe (*Fusarium* sp.), sclerotic disease (soil water relations), 'aged breakdown' and stem gall (of unknown origin), and sereh. Among the organisms parasitizing the roots or basal portions of the cane (V) are *Marasmius sacchari*, *Pythium* spp., and *Rhizoctonia* sp.

A further section (VI) has been added to accommodate foliar yellowing and cessation of stalk elongation (nitrogen deficiency); leaf-spotting (manganese or calcium deficiency); leaf streak (manganese chlorosis); leaf-spotting followed by 'firing' and reddish discoloration of the midribs (potassium deficiency); various types of 'dead cane'; reddish discoloration of stalks or midribs due to *Alternaria tenuis* and probably other fungi, preceded by or associated with various injuries, and leaf spots of a similar nature; and different types of growth failure of undetermined origin.

PICBAUER (R.). **Addenda ad floram Čechoslovakiae mycologicam. Pars IX.** [Additions to the mycological flora of Czechoslovakia. Part IX.]—*Sborn. Kl. přír. Brně*, 28, pp. 58–66, 1948. [Received December, 1950.]

This further addition to the author's annotated list of fungi found in Czechoslovakia [*R.A.M.*, 17, p. 704] includes *Peronospora nasturtii-aquatici* on watercress, *Guignardia carpinea* on fallen leaves of *Carpinus betulus*, *Nectria brassicae* on cabbage, and *Puccinia aecidii-leucanthemi* on *Chrysanthemum leucanthemum*.

GREENE (H. C.). **Notes on Wisconsin parasitic fungi. XIV.**—*Amer. Midl. Nat.*, 44, 3, pp. 630–642, 1950.

Included in this further critically annotated report on Wisconsin parasitic fungi [*R.A.M.*, 28, p. 594] and additional hosts, besides five other new species and a new combination, is *Colletotrichum prunicola* n.sp., which produces on *Prunus serotina* leaves light brown, circular or somewhat irregular spots, 2 to 6 mm. in diameter, with narrow, reddish margins. The amphigenous, mostly epiphyllous, subcuticular acervuli measure 65 to 200 μ in diameter; the dimensions of the fuscous-purple, straight to subflexuous, non- to triseptate setae, paling and tapering towards the apex, are 50 to 200 by 4·5 to 7 μ; and those of the hyaline, falcate, granular, continuous conidia 19 to 23 by 3·5 to 4 μ.

GOPALKRISHNAN (K. S.). **Notes on the morphology of the genus Hemileia.**—Abs. in *Phytopathology*, 40, 1, p. 10, 1950.

In 32 species of *Hemileia* examined the sori fell into three distinct morphological types [cf. *R.A.M.*, 26, p. 199], namely, subepidermal, superstomal A, characterized by numerous feeder hyphae forming fascicles in the substomal cavity, and superstomal B, with few feeder hyphae. In *H. jasmini* the sorus arises from a single hypha. The superstomal A type, represented by *H. vastatrix*, was found to predominate in the genus. Negative results were given by cross-inoculations to coffee leaves with various aecidia from a number of angiospermous hosts, and to the aecidial hosts with basidiospores of *H. vastatrix*. The importance of primary sori in rust classification is emphasized, the basal cells and teleutospore variations being regarded as less reliable criteria for generic differentiation. Knowledge of the sorus suggests a possible relationship of *Hemileia* to *Cystopsora* and *Gerwasia*.

BAXTER (J. W.) & CUMMINS (G. B.). **Polioma Arth., a valid genus of the Uredinales.**—*Bull. Torrey bot. Cl.*, 78, 1, pp. 51–55, 4 figs., 1951.

Polioma Arthur is reinstated as a valid genus of the Pucciniaceae to accommodate four rusts of the Labiatae and Geraniaceae with sessile teleutospores; two of these were originally transferred by Arthur and *P. robusta* n. sp. on *Salvia compacta* from Mexico and *P.* (*Puccinia*) *unilateralis* n.comb. on *Geranium* spp. are added.

BOEDIJN (K. B.) & REITSMA (J.). **Notes on the genus Cylindrocladium (Fungi: Mucedineae).**—*Reinwardtia* (continuation of *Bull. Jard. bot. Buitenz.*), 1, 1, pp. 51–60, 3 figs., 1950.

This is a critically annotated list, preceded by some introductory observations

and a key, of seven species of *Cylindrocladium*. The authors recommend that the genus *Candelospora* should be merged in *Cylindrocladium*, which is considered to be close to *Fusarium*. *C. parvum* [*R.A.M.*, 7, p. 508] was found on male flowers of *Arenga pinnata*, and *C. scoparium* [ibid., 19, p. 221 *et passim*] (syn. *C. pithecolobii*) on *Sesbania sesban* seedlings, both at Bogor, Java. *C. macrosporium* [ibid., 7, p. 508] is described from a culture obtained from the Centraalbureau voor Schimmelcultures, Baarn. It comprised several triseptate conidia measuring 66 to 82 by 5 to 6 μ, indicating that *C. macrosporium* is a transitional form between the species with bi- and pluriseptate conidia. *Candelospora citri* [ibid., 29, p. 100] becomes *Cylindrocladium citri* n. comb.

C. ilicicola (Hawley) Boedijn & Reitsma n. comb. was found on potato tubers at Bogor. A comparison of the Java specimens with the type material of *Candelospora ilicicola* (*Proc. R. Irish Acad.*, 31, pp. 1–26, 1 pl., 1912) revealed complete identity. Cultures of *Cylindrocladium ilicicola* contained numerous oval to elliptical, orange-coloured perithecia, 400 to 500 by 320 to 370 μ, furnished with a papillate ostiole, 45 to 50 μ in diameter. They belong to *Calonectria ilicicola* n. sp. The clavate, long stipitate, very thin-walled asci, 110 to 140 by 16 to 18 μ, with stalks 3 to 4 μ in breadth, contain eight irregularly crowded, fusoid, slightly curved or inequilateral ascospores, 38 to 57 by 5 to 7 μ, bicellular within the ascus but becoming on extrusion four- to six- (mostly four-) celled, readily germinating in water by means of a germ-tube at either end.

Cylindrocladium curvatum n. sp. is described from *Hibiscus sabdariffa* seedlings at Bogor. Its conidiophores are 200 to 250 by 4 to 5 μ, the primary branches 25 to 31 by 2·5 to 4 μ, the secondary 9 to 12·5 by 2 to 2·5 μ, and the phialides 7·5 to 10 by 2·5 μ. The head of the main axis is 6 to 7 by 5 μ. The cylindrical conidia are uniseptate, distinctly bent, and 40 to 60 by 3 to 4 μ. Cultures were brown on the reverse due to numerous, radially arranged chlamydospores and sclerotia-like bodies.

C. quinqueseptatum n. sp., collected on clove seedling leaves near Bogor, produces conidiophores up to 0·5 mm. by 5 to 6 μ, the primary branches measuring 22 to 31 by 3·5 to 5, the secondary 17 to 21 by 3 to 3·5, and the tertiary (if present) 15 to 17 by 2 to 3 μ, the ultimate branches bearing 2 to 4 phialides, 11 to 12 by 2 to 3 μ; the main axis is about 2 μ in width, gradually elongating and becoming somewhat clavate towards the apex; the straight, cylindrical conidia, rounded at the ends, 75 to 106 by 5 to 7 μ, are provided with three to six (mostly five) septa. The cultures are tawny to zinc orange, with a white edge, of loose texture, radially striate through darker fibres and with some indistinct concentric zones.

Malan (C. E.). **Su un nuovo reperto di Dicyma ambigua Peyronel e sulla posizione sistematica di questa specie.** [On a new report of *Dicyma ambigua* Peyronel and the systematic position of this species.]—*Nuovo G. bot. ital.*, N.S., 56, 4, pp. 735–738, 1 fig., 1949.

Dicyma ambigua, rather common in mountain forest soils, is the conidial state of *Myxotrichum aeruginosum* (B. Peyronel: *Ann. mycol., Berl.*, 12, 5, 1914) and resembles the description and drawing of *Oidiodendron griseum* [*R.A.M.*, 14, p. 275]. Because *Dicyma* spp. are usually the conidial states of *Ascotricha* spp., the author proposes the new combination *O. ambiguum* (Peyronel) Malan.

Oster (G.). **Two-phase formation in solutions of Tobacco mosaic virus and the problem of long-range forces.**—*J. gen. Physiol.*, 33, 5, pp. 445–473, 3 diags., 6 graphs, 1950.

In a nearly salt-free medium a dilute tobacco mosaic virus solution of rod-shaped virus particles of uniform length [*R.A.M.*, 27, p. 161] forms two phases, of which the bottom optically anisotropic phase has a higher virus concentration than the

top optically isotropic. In a sample containing particles of various lengths, those of the bottom phase are longer than those of the top and the concentrations are nearly equal. The longer the particles the less the minimum virus concentration requisite for two-phase formation. Increasing the salt concentration augments the minimum concentration. The minimum concentration for two-phase formation is that concentration at which correlation in orientation between the rod-shaped particles begins to take place. It is determined by the thermodynamically effective size and shape of the particles as obtained from the concentration dependence of the osmotic pressure of the solutions measured by light-scattering. The thermodynamically effective volume of the particles and its dependence on salt concentration are explained in terms of the shape of the particles and the electrostatic repulsion between them.

The bottom layer of freshly purified tobacco mosaic virus samples shows Bragg diffraction of visible light. The diffraction data indicate that the virus particles in solution form tridimensional crystals about the same size as the crystalline inclusion bodies found in the cells of plants suffering from the disease.

Commoner (B.), Mercer (F. L.), Merrill (Phyllis), & Zimmer (A. J.). **Micro-analytical determination of the rate of Tobacco mosaic virus synthesis in Tobacco leaf tissue.**—*J. biol. Chem.*, 27, 2, pp. 271–286, 10 graphs, 1950.

A new, exact micro method is described from the Henry Shaw School of Botany, Washington University, Missouri, for the quantitative determination, as protein, of the tobacco mosaic virus content of 10 to 15 mg. infected tissue [cf. *R.A.M.*, 21, p. 473, and next abstract]. Accurate determinations of a minimum of about 10 μgm. virus are practicable. Applied to the determination of the time course of tobacco mosaic virus synthesis in isolated leaf blade sections [cf. ibid., 22, p. 376], it was found that the appearance of the virus after leaf tissue inoculation follows an exponential curve. Initiation of virus synthesis usually occurs within 30 hours after inoculation. Detectable amounts of virus are recovered after about 72 hours, and a rapid increase takes place after 100 to 200 hours, during which period virus content doubles in approximately 24 hours; after this there is no further increase. The maximum quantities of virus produced under these conditions are comparable to the tobacco mosaic virus content of corresponding amounts of systemically infected foliar tissue.

Kutsky (J.) & Rawlins (T. E.). **Inhibition of virus multiplication by naphthalene acetic acid in Tobacco tissue cultures as revealed by a spectrophotometric method.**—*J. Bact.*, 60, 6, pp. 763–766, 1950.

The following spectrophotometric method for research on the chemotherapy of the tobacco mosaic virus was developed at the Division of Plant Pathology, University of California. Sections 2 to 3 mm. thick of the upper internodes of young tobacco plants infected with mosaic virus were cultured on a nutrient agar medium adjusted to pH 6, and incubated at 31° C. For the determination of their low virus content [see preceding abstract] the frozen sections were homogenized for one minute and subjected to an incubation-dialysis treatment to facilitate the removal of their products, leaving the virus behind. The fluid in the dialysis sack was then centrifuged and the optical density of each supernatant determined at 260mμ with a Beckman spectrophotometer.

The fluid from stems infected 28 days previously had an optical density about three times that of uninfected tissues and rod-shaped virus particles were detected in it by electron microscopy. About 80 per cent. of the original virus was recovered by this method. Since it reveals differences of 15 per cent. in virus concentration it appears to be sufficiently accurate for use in screening compounds for their effect

on virus multiplication. Tissue cultures treated with a 10^{-4} concentration of naphthalene acetic acid (almost the toxic concentration for such cultures) contained between 0·2 and 0·4 of the amount of virus (per fresh weight of tissue) present in untreated cultures [*R.A.M.*, 28, p. 35]. This was the only compound of many tested that decreased the virus concentration in plant tissue cultures without being distinctly toxic.

Ashby (D. G.). **The phytotoxic effects of D.D.T., B.H.C., parathion, and toxaphene on Tobacco.**—*Ann. appl. Biol.*, 37, 4, pp. 624–639, 5 figs., 5 graphs, 4 diags., 1950.

In tests carried out in Southern Rhodesia no phytotoxic effect was observed following a pre- or post-sowing application of technical DDT, or after a pre-sowing application of parathion (diethyl paranitrophenyl thiophosphate, 2 per cent. dust) [see next abstract] at 1·8 lb. parathion per acre, but the latter caused serious stunting and many deaths when used in excess. Toxaphene (chlorinated camphene) also was non-toxic in normal doses. Benzene hexachloride [*R.A.M.*, 29, p. 143] applied before sowing suppressed root development in newly germinated seedlings, caused temporary distortion and stunting of 11-day-old seedlings, and mortality in three-weeks-old seedlings at the higher dosages.

Ciferri (R.) & Bertossi (Felice). **Efficacia nematicida ed anticrittogamica del 'parathion'.** [Nematodicidal and antifungal efficacy of 'parathion'].—*Notiz. Malatt. Piante, 1950*, 12, pp. 59–64, 1950. [English summary. Mimeographed.]

At the Cryptogamic Laboratory, Pavia, when Burley tobacco seed was sown in pots containing soil known to be heavily infested with *Pythium debaryanum* [*R.A.M.*, 28, p. 425] to which parathion [cf. ibid., 28, p. 393, and preceding abstract] had been added at the rate of 400 mgm. per kg. air dry soil, damping-off mortality was 34·3 per cent. as compared with 86·3 per cent. in the untreated. The reduction of the number of seedlings per treated pot by about 50 per cent. is ascribed not to the parathion but to other contents of the commercial preparation.

Marcelli (E.). **Ulteriori osservazioni sulla specializzazione dell' 'Oidio' del Tabacco.** [Further observations on the specialization of Tobacco 'mildew'].—*Notiz. Malatt. Piante, 1950*, 12, pp. 49–51, 1950. [Mimeographed.]

This work on *Erysiphe cichoracearum* on tobacco has already been noticed from another source [*R.A.M.*, 30, p. 248].

Goldin (M. I.) & Parievskaya (Mme A. P.). Материалы по столбуру Томатов в Крыму. [Woodiness of Tomatoes in the Crimea.]—Микробиология [*Microbiology*], 19, 6, pp. 527–531, 1 fig., 1950.

Experiments carried out in the summer of 1949 at the Microbiological Institute of the U.S.S.R. Academy of Sciences, Moscow, confirmed that *Hyalesthes obsoletus* is the main vector of the woodiness disease of tomatoes [tomato big bud virus: *R.A.M.*, 27, p. 48] in the Crimea. The disease was most prevalent in the Zuisk district, where the insect was very abundant. In field tests under natural conditions of infection, the 'stemmed' varieties Jubilee, Alpateva, and Gribovsky were the most resistant, being free from infection in three different localities.

In the course of this study the authors observed in the Krasnodar district tomato leaf curl, a virus disease first described by Sukhov and Vovk (A new virus disease of tomato—leaf curl—and its vector *Agallia venosa*.—*C.R. Acad. Sci. U.R.S.S.*, N.S., 56, p. 433, 1947), and bronzing of tomato leaves [*R.A.M.*, 28, p. 161] also of virus nature [? tomato spotted wilt].

Pearson (G. A.). **Management of Ponderosa Pine in the Southwest.**—*Agriculture Monogr. U.S. Dep. Agric. For. Serv.* 6, 218 pp., 2 diags., 49 figs., 2 maps, 11 graphs, 1950.

In the section of this monograph dealing with fungal diseases (pp. 165–169) it is stated that western red rot (*Polyporus ellisianus*) [*R.A.M.*, 21, p. 234; 23, p. 51] is the most important disease of ponderosa pine (*Pinus ponderosa*) in Arizona and New Mexico, affecting commonly up to 20 per cent. of virgin stands. It is recommended that a shorter rotation be practised, aiming at harvesting trees before they are 200 years old; close spacing throughout the pole stage should be maintained, and stands improved by eliminating the roughest stems and pruning the best ones before their diameter exceeds 8 in.; the amount of cull logs and timber left in the woods should be reduced to a minimum.

Cronartium filamentosum [ibid., 23, p. 156] is responsible for a decline of the trees in some areas. The crown is attacked, beginning mostly at the tip but sometimes at the base or in the middle portion, resulting in rapid death of the affected parts. However, spread is slow and the tree may remain alive for many years. Under a short cutting cycle almost all infected trees can be salvaged.

Root rot caused by *Fomes annosus* [ibid., 25, p. 374] and *Armillaria mellea* [ibid., 22, p. 184] incurs losses of seedlings and saplings.

It is estimated that owing to heart rot the reduction of increment below a possible 200 bd. ft. per acre under extensive management (cutting cycles of 40 to 50 years) is 6 per cent., and 2 per cent. is caused by blister rust and other rots; under intensive management (cutting cycles of 20 years or less and aiming at constant improvements of stands) the corresponding figures are 2 and 1 per cent., respectively.

Quel avenir est réservé aux Châtaigneraies françaises? [What is the future of the French Chestnut groves?]—*Rev. hort., Paris*, 123, 2177, p. 349, 1951.

A description is given of a method devised by M. Venot for the rapid vegetative multiplication of two lines of exotic chestnut selected in France for their resistance to ink disease (*Blepharospora* [*Phytophthora*] *cambivora*) [and *P. cinnamomi*: *R.A.M.*, 26, p. 320; 30, p. 128]. Most of the one- to two-year-old seedlings from seed collected from a wide range of healthy trees were killed by the disease. The danger of the possible introduction of *Endothia parasitica* [see next abstract] is discussed.

Graves (A. H.). **Relative blight resistance in species and hybrids of Castanea.**—*Phytopathology*, 40, 12, pp. 1125–1131, 1 fig., 1950.

The information presented in this paper on the reactions to *Endothia parasitica* of some 2,000 chestnut trees of 12 species and one variety, and also numerous hybrids in plantations in Connecticut and elsewhere in the United States, is based on the results of extensive inoculation experiments, as well as on personal observations covering a period of over 30 years [*R.A.M.*, 23, p. 282]. Eight of the species have been assigned definite ratings as follows. The Chinese chestnut (*Castanea mollissima*) was the only one to be placed in the very resistant class I (no growth of fungus after insertion of inoculum) [ibid., 26, p. 176]. Its comparative tenderness is a complicating factor, since the fungus readily penetrates branches killed by cold and gradually passes from a saprophytic to a parasitic habit. Trees over ten years old, however, are resistant to cold.

The Japanese chestnut (*C. crenata*), of which, according to Pavari, there are 70 or 80 varieties [ibid., 28, p. 428], and one accession of the Seguin (*C. seguinii*) occupy the resistant class II (only slight fungal growth followed by complete healing with callus formation round the canker). Another accession of *C. seguinii* was distributed in classes III and IV, the former rated as somewhat susceptible (slow

growth of pathogen, callus sometimes formed but may be invaded later), and the latter as susceptible (fairly rapid fungal growth, no callus formed). The Alleghany chinquapin (*C. pumila*) is assigned (from observation only) to class III, the Ozark chinquapin (*C. ozarkensis*) to classes III and IV, the chinquapin (*C. henryi*) and the Spanish chestnut (*C. sativa*) to class IV, and the American chestnut (*C. dentata*) to the very susceptible class V (very rapid fungal growth, no callus formation). Within the last-named species, however, there is marked variation in respect of resistance to blight, a case of which (obviously of genetic origin) is cited.

At present the experimental plantations contain about 1,000 hybrids, of which the most resistant are the J(apanese) A(merican) hybrids, JA×J, and J×JA in classes II and III; JA×JA in II, III, and IV; (JA×J)×(JA×J) in II, III, and IV; C(*C. mollissima*) A and AC in II and III; C×JA in I, II, and III; C×seg. (*C. seguinii*) in I and II; (C×seg.)×J in I, II, and III; and S8 (Vanfleet hybrid *C. crenata*×*C. pumila*)×J, S8×C, and (A×S8)×C in II and III.

Caroselli (N. E.) & Feldman (A. W.). **Dutch Elm disease in young seedlings.**—*Phytopathology*, 41, 1, pp. 46–51, 2 figs., 1951.

Hitherto the difficulty of obtaining a sufficiently high incidence of infection by *Ceratostomella ulmi* on elm seedlings (as opposed to field trees) by the agar disk and spore suspension methods of inoculation has seriously impeded progress on control investigations and chemotherapy studies [*R.A.M.*, 30, p. 252]. However, in recent experiments 100 per cent. wilt and vascular discoloration was induced in two-year-old seedlings in full leaf kept in darkness for five days before inoculation with a spore suspension, after which they were maintained in nine-hour daylight. This mode of inoculation was successfully used in chemotherapy studies jointly undertaken by the Rhode Island Agricultural Experiment Station and the Bartlett Tree Research Laboratories at Stanford, Connecticut, on over 2,400 seedlings. In the light of these data it is postulated that extensive wilting must necessarily be preceded firstly by a physiological change in the host consequent on a reduction of the carbohydrate or metabolite reserve, and secondly, by a light factor.

Roth (E. R.). **Cankers and decay of Oak associated with Irpex mollis.**—*Plant Dis. Reptr*, 34, 11, pp. 347–348, 1 fig., 1950. [Multilithed.]

Irpex mollis occurs frequently in the southeastern United States on decayed hardwood timber. On living oak trees it is also associated with cankers [cf. ibid., 21, p. 395], which are fairly common in the vicinity of Walhalla, South Carolina, and also occur in adjacent areas in Georgia. The deep, sunken, or diffuse cankers, which always have a branch stub at the centre, occur up to 20 ft. above the ground on white oak [*Quercus* spp.], chestnut oak [*Q. montana*], southern red oak [*Q. falcata*], and black oak [*Q. velutina*]. Apparently the fungus enters through the stub. The decay starts as creamy white radial lines concentrated mostly along the rays. Later the wood between the rays rots and becomes tough and spongy. Much of the heartwood cylinder is usually badly decayed, with numerous finger-like rotted areas spreading toward the sapwood. The region of advanced decay continues vertically for several feet, tapering to a thin central core, beyond which small white flecks occur. The fungus was easily isolated from the specks, as well as from the decayed wood behind the cankers.

There is apparently no relation between tree vigour and the incidence of cankers. Losses due to *I. mollis* are of little economic importance, except in local areas where conditions are favourable for its development.

Foster (R. E.). **Forest pathology.**—*For. Chron. spec. Suppl.* (Serial No. 98), pp. 24–34, 1950.

According to R. Pomerleau, the evidence now indicates that birch die-back

[*R.A.M.*, 30, p. 18] has not spread from a central area in New Brunswick, but it continues to kill off the trees rapidly.

V. J. Nordin reports that white pine blister rust [*Cronartium ribicola*: ibid., 23, p. 122; 28, p. 258, and next abstract] appears to occur throughout the natural range of *Pinus monticola* in the Maritime Region of Canada; incidence appeared insufficient to warrant a programme of *Ribes* eradication. In a search for resistant trees stands have been examined in 30 different areas, with encouraging results. An experimental garden has been established at Duncan, British Columbia, to test the resistance of selected trees under optimum conditions of infection.

H. W. Eades reports from Vancouver that senescent cultures of wood-destroying fungi benefit materially from growth on cherry concoction media, though healthy cultures are not improved.

The report of the Dominion Forest Pathological Service by R. E. Foster records that further sampling of white spruce (*Picea glauca*) in the Upper Fraser Region [cf. ibid., 25, p. 531; 28, p. 430] showed that in 681 trees of pulpwood size the loss from decay amounted to 11 per cent. Over 73 per cent. of the total decay volume was associated with [unspecified] basal infections. In view of the additional losses from [unspecified] root rot recorded for windthrown trees it is considered that an appreciation of the susceptibility of spruce to losses of this nature will be necessary in the future management of this species.

Pole blight of western white pine (*Pinus monticola*) [ibid., 29, p. 65] is widespread throughout the commercial range of this species in the interior of British Columbia. Four areas were investigated, in which 29 to 45 per cent. of the stand was affected. A number of organisms were isolated from diseased material and studies have been started on their relation to the disorder.

Control of White Pine blister rust.—*Leafl. U.S. Dep. Agric.* 265, 8 pp., 1 col. pl., 8 figs., 1950.

The present geographical distribution of white pine blister rust [*Cronartium ribicola*: C.M.I. map No. 6; *R.A.M.*, 28, p. 653, and preceding abstract] in the United States is given, followed by a note on control by the eradication of *Ribes* [ibid., 29, p. 570].

Hodson (A. C.) & Christensen (C. M.). **Minnesota forest insect and disease survey report for 1946 and 1947.**—*Pap. misc. J. Ser., Minn. agric. Exp. Sta* 634, 10 pp., [? 1950. Mimeographed. Received December, 1950.]

In this report on diseases of forest trees in Minnesota it is stated that during 1946 canker rust, or sweetfern rust [*Cronartium comptoniae*: *R.A.M.*, 8, p. 685; 24, p. 41] of Jack pine [*Pinus banksiana*] was found on the trunks of 10 per cent. of trees 4 to 8 ins. in diameter in certain stands at the Cloquet Forest Experiment Station. Most of the cankers were two to three feet long and covered from one-quarter to one-half the trunk circumference. This disease is not rapidly fatal [cf. ibid., 17, p. 360], but it deforms the trunk, in some cases appears to stunt the trees, and may allow decay to set in. It can be recognized with certainty only in late May and early June, when the orange-coloured aecidia are present. The disease may be much more prevalent than the survey indicated. Spruce needle rust (*Chrysomyxa cassandrae*) [ibid., 30, p. 124] was reported from several localities.

In 1947 infection by *Coleosporium solidaginis* [ibid., 27, p. 45] occurred on red pine [*Pinus resinosa*] near Garrison, causing light defoliation. The destruction of the alternate hosts, golden rod [*Solidago* spp.] and *Aster*, is the only control. Aspen [*Populus* spp.] canker (*Hypoxylon pruinatum*) [ibid., 24, p. 255] appeared to be increasing in prevalence. It is general in Minnesota, where areas in the north-east appear to be most heavily infected.

Carranza (J. M.). **Una 'Alternaria' parásita de las coniferas en la Argentina.** [An *Alternaria* parasitic on conifers in Argentina.]—*Lilloa Rev. Bot., Tucumán*, 21, pp. 279–289, 4 pl., 1949. [English summary.]

A fungus of the *Alternaria tenuis* group was isolated from specimens of pine and *Cedrus* seedlings cultivated in various localities of the Province of Buenos Aires [cf. *R.A.M.*, 8, p. 616; 14, p. 409; 18, p. 358; 25, p. 531]. The disease is manifested in nature by successive wilting, chlorosis, and death of the branches, twigs, and leaves, accompanied in severe cases by complete defoliation. Inoculation experiments on *Pinus* sp., *P. pinea*, and *Cupressus torulosa* resulted in wilting and a typical curvature of the shoot tips. None of these species is mentioned in the Argentine literature as a host of *A.* sp. or *A. tenuis*, which have not been reported on *Cedrus* from abroad. Damping-off occurred in only 3 per cent. of the pine seedlings used in the tests. The fungus seems to be a weak parasite which assumed a more virulent form on wounded material or in young tissues. It is, however, potentially dangerous on account of its wide distribution and capacity for aggression. The incubation period during the warmest months (December to February) was two to three days and in the coldest (June to August) 20 days.

The pathogen is characterized by conidia 10·2 to 61·2 by 7·65 to 16·57 (mean 32·23 by 12·7) μ, 12 per cent. being furnished with lateral beaks.

Grasso (V.). **Un nuovo agente patogeno del Cupressus macrocarpa Hartw. in Italia.** [A new pathogenic agent on *Cupressus macrocarpa* Hartw. in Italy.] - Reprinted from *Ital. for. mont.*, 6, 1, 6 pp., 1 pl., 1951. [French and English summaries.]

In May, 1950, the author received from the vicinity of Florence a portion of the crown of a wilting *Cupressus macrocarpa* tree. The cortex bore numerous acervuli measuring 1·3 by 1·1 mm., scattered over the cracks and filled with a blackish mass of 5-septate conidia measuring 20 to 26 by 7 to 10 μ. The median cells were olivaceous-brown and the extremities hyaline and without setae. Only two trees were affected. The fungus was identified as *Coryneum cardinale* [cf. *R.A.M.*, 28, p. 495; 29, p. 497], not before reported from Italy. Wound inoculations of *Cupressus macrocarpa* seedlings in the laboratory reproduced the condition.

Day (W. R.). **The soil conditions which determine wind-throw in forests.** — *Forestry*, 23, 2, pp. 90–95, 1950.

The part played by [unspecified] root diseases [*R.A.M.*, 25, p. 586] in wind-throw of forest trees is that of reducing or restricting the mass of soil held by the roots. The dying of the root fibres, and eventually of the larger roots, may promote liability to wind-throw even in deeply rooted trees on freely draining soil, although it is likely to be extensive and serious only on more or less shallow soils where deep rooting is restricted by poor drainage. Butt rot and the dying of patches of plantation trees which are usually in the high pole stage, and the splitting of the main stems of conifers through drought are often merely other aspects of root disease, which inevitably arises on soils of unduly limited capacity.

Findlay (W. P. K.). **The resistance of wood-rotting fungi to desiccation.** - *Forestry*, 23, 2, pp. 112–115, 1950.

Experiments were carried out at the Forest Products Research Laboratory, [Princes Risborough], to determine the longevity of fungi in air-dry wood [cf. *R.A.M.*, 29, pp. 392, 593]. Sitka spruce (*Picea sitchensis*) blocks measuring 5 by $1\frac{1}{2}$ by $1\frac{1}{2}$ in. were exposed for four months to pure cultures of *Merulius lacrymans* [loc. cit.], *Lenzites sepiaria* [loc. cit.], *L. trabea* [ibid., 29, p. 3], and *Poria monticola*

[loc. cit.]; Scots pine blocks (*Pinus sylvestris*) to *Lentinus lepideus* [ibid., 9, p.147]; and beech blocks to *Polystictus versicolor* [ibid., 22, p. 2]. The spruce blocks were then kept for one month at a relative humidity of 90 per cent. before transfer to 90, 75, 60, or 45 per cent. relative humidity at 25° C.; the pine and beech blocks were transferred direct to the various humidities after one day's drying in the laboratory.

Lenzites sepiaria, *L. trabea*, and *P. versicolor* were still alive after five years' storage at 25° C. and 45 per cent. relative humidity, i.e., in wood having a moisture content of about 10·5 per cent. *M. lacrymans* remained viable for four months, *Poria monticola* for 13, and *Lentinus lepideus* for 41. It appears, therefore, that simple air-drying cannot be relied upon to kill fungus infection in timber within a reasonable time. In nature certain species such as *L. sepiaria* and *P. versicolor* may remain dormant when the substratum dries out and resume their activity when conditions become sufficiently moist. Timber known to have been even slightly infected with wood-rotting fungi should be sterilized either by pressure treatment with a wood preservative or by heat treatment in a timber drying kiln, provided that the atmosphere in the kiln is kept sufficiently moist to prevent drying out and shrinkage of the wood.

Non-pressure creosote treatment of White Cedar.—*Timb. News*, 58, 2134, p. 316, 1950.

A series of tests was carried out at the University of Illinois to determine the effect of several non-pressure creosote processes in extending the life of northern white cedar [*Thuja occidentalis*] posts and poles exposed to [unspecified] decay [cf. *R.A.M.*, 29, p. 189]. The importance of incision is emphasized, not only in increasing the absorption of the preservative oil but also in forming a uniform protective shell over the entire outer surface of the post or pole. In order to have a protective shell $\frac{1}{4}$ in. thick the rate of impregnation for a 4 in. post 42 in. long should be 1·85 lb. per post, or 6 lb. per cu. ft. of wood per post; 2·35 lb. (5 lb.) for a 5 in. post; and 2·85 lb. (4·2 lb.) for a 6 in. Approximately double would be required for a shell $\frac{1}{2}$ in. thick.

Heuser (E.), Shema (E. F.), Shockley (W.), Appling (J. W.), & McCoy (J. F.). **The effect of lignin-destroying fungi upon the carbohydrate fraction of wood.**—*Arch. Biochem., N.Y.*, 21, 2, pp. 343–350, 1949.

It would appear from the results of a preliminary study at the Institute of Paper Chemistry, Appleton, Wisconsin, that the pure cellulose in aspen wood is only slightly attacked by *Polyporus pergamenus* [*R.A.M.*, 26, p. 36]; that the presence of pentosans in a cellulosic material, such as holocellulose, gives rise to a considerably intensified attack on the cellulose constituent; and that both the pentosans and the lignin tend to promote the utilization of the cellulose by the fungus.

Pascoe (T. A.) & Scheffer (T. C.). **Jack Pine pulpwood deterioration in yard storage.**—*Paper Tr. J.*, 131, 2, pp. 16–18, 20–21, 9 graphs, 1950.

Following a brief bibliographical review, the authors explain the methods and describe and tabulate the results of an investigation designed to yield definite information on the effect of prolonged storage of rough and peeled northern jack pine [*Pinus banksiana*] wood intended for pulping [*R.A.M.*, 29, p. 547]. A quantity of the wood was cut from a single tract in north-central Wisconsin and placed in typical yard storage for 21 months. Pulp made at each storage interval (7, 11, 14, 21, and 26 months) was converted into a standard grade of paper on the same machine. The average percentages of the entire volume rotted in peeled and rough bolts after 26 months were 1·6 and 72·2, respectively. There was,

however, some loss of strength in the pulp made from the peeled wood, though much less than that incurred by the rough bolts.

LUTHARDT (W.). **Leached wood obtained by means of artificially cultured wood-inhabiting fungi.**—*Holzforschung*, 3, 4, pp. 117–121, 8 figs., 1949. [German. Abs. in *Bull. Inst. Pap. Chem.*, 20, 2, p. 129, 1949.]

Beechwood bolts were inoculated, by a technique devised by the author, with *Pholiota mutabilis* [*R.A.M.*, 21, p. 58], and samples were removed and analysed over a period of $3\frac{1}{2}$ years. At the end of this time the specific gravity of the residue of wood was 0·22, as compared with 0·63 at the commencement of the test, cellulose content 33·2 per cent. (38·8), pentosans 28·6 (24·7), and lignin 23·4 (22·9). The prevailing opinion that white rot [ibid., 11, p. 342; 30, p. 296 *et passim*] attacks lignin primarily is rejected on the basis of these data.

GRASSO (V.). **Nuove e gravi malattie di piante ortive in Italia.** [New and serious diseases of kitchen-garden plants in Italy.]—Reprinted from *Riv. Ortofloro-frutticolt. ital.*, 34, 1–2, 6 pp., 2 figs., 1950. [English summary.]

In January, 1950, celery growing in a kitchen-garden near Florence developed serious and widespread rotting, while cauliflowers, lettuces, and artichokes (*Cynara cardunculus* and *C. scolymus*) near by were similarly affected, the causal organism being *Sclerotinia sclerotiorum* [cf. *R.A.M.*, 11, p. 429; 24, p. 349; 30, p. 207]. This is stated to be the first record of the fungus on celery and artichoke in Italy. Further investigations are in progress.

ISIYAMA (S.) & MISAWA (T.). **Stunt disease of Japanese Radish.**—*Ann. phytopath. Soc. Japan*, 12, 2–4, pp. 116–130, 8 figs., 1943. [Japanese, with English summary. Received November, 1950.]

Radishes at Sizuoka in autumn, 1939, were badly stunted and the leaves developed vein-clearing, ruffle, mottle [*R.A.M.*, 28, p. 318], malformation, vein-banding, enation, and string-like, protruding veins. The pods and peduncles were also mottled. The causal virus, which was detected in the roots, leaves, peduncles, pods, and immature seeds of affected plants, was inactivated by heating for 10 minutes at 70° C. and by diluting the expressed juice up to 15,000 times. It passed through Berkefeld filters V, N, and W and retained its viability after ageing *in vitro* for 23 days and after 39 days in dry, diseased leaves. The disease was transmitted in the greenhouse by *Myzus persicae* and the false cabbage aphid (*Rhopalosiphum pseudobrassicae*) [loc. cit.]. The host range of the virus included 10 plant species representing 4 genera in 4 families. Infection was obtained on rape (*Brassica napus*), leaf mustard [*B. juncea*], pe-tsai [*B. pekinensis*], radish, stock [*Matthiola incana*], pe-tsui [*B. oleracea*], pak-choi [*B. parachinensis*], turnip, santosai (*B. pekinensis* var. *dentata*), mibuna (*B. japonica* var. *indivisa*), spinach, pea, and *Capsicum annuum* var. *acuminatum*.

The stunt disease in question appeared to differ considerably from other mosaic diseases of crucifers.

HOWARD (H. W.) & LYON (A. G.). **'Crook root' of Watercress.**—*N.F.U. Watercress Branch News Sheet*, 12, 49, pp. 7–8, 1950.

Crook root of watercress, caused by a species of *Spongospora*, is by far the most important single factor (apart from the right kind of water) controlling the growth of the crop in England. The initial symptoms consist in 'kinking', swelling, distortion, and very slow growth of the roots, followed in green cress by only a certain reduction of vigour. Brown cress is much more severely checked in growth and displays a characteristic turning back of the leaves, often accompanied by yellowing or bronzing. A long, straggly underwater stem bearing only a terminal rosette of leaves

and with no quick-growing side shoots is also characteristic. Growth check starts in December or January, but symptoms have been observed as early as mid-October. Plants often appear to recover in spring, a late crop being obtained. Infection generally begins at the bottom of the beds, and is always worse there than elsewhere.

The severity of an attack appears to depend on the difference between the rate of growth and the rapidity with which the new roots become infected. Increasing the growth rate of the plants will keep the disease in check and enable saleable crops to be produced in February instead of in April and May.

Growers whose beds are unaffected should take every precaution against introducing the disease. Those who have slight infection at the bottom of the beds should destroy the affected plants.

Clean stocks of green cress may be grown from 'tops' or from seed; the latter will also be free from virus disease [? cucumber mosaic virus: cf. *R.A.M.*, 10, p. 329; 15, p. 672; 28, p. 261] and as the growth rate is probably 10 per cent. higher plants from seed may be less checked by root disease. When beds are replanted they should be dried out as long as possible and all infected stubble destroyed. If the disease is approaching the stage where the plants are about to come away from the bottom, the water level should be lowered as far as possible. In some beds a shallow current rather than a 'pond' effect is desirable. New beds, well isolated from others, should be started and stocked from healthy material.

CHAUDHURI (R. P.). **Studies on two aphid-transmitted viruses of leguminous crops.** —*Ann. appl. Biol.*, 37, 3, pp. 342–354, 1950.

In experiments carried out at Rothamsted with pea mosaic virus [*R.A.M.*, 19, p. 561; 29, p. 140] obtained from naturally infected field plants, the virus was transmitted by inoculation to several leguminous hosts, including *Trifolium subterraneum*. *Phaseolus vulgaris* varieties Prince and Bountiful, red clover, white clover, lucerne, and Russell lupin were non-susceptible. Vectors include *Myzus persicae* and *Aphis fabae*; *Hyperomyzus staphyleae* did not transmit the virus. Transmission was most efficient when vectors were fasted for 15 minutes and given an infection feeding of one hour. Infection feeding for two minutes and test feeding for five are sufficient for *M. persicae* to transmit the virus. Preliminary fasting influences vector efficiency only if the infection feeding time is short. Most aphids became non-infective within 15 minutes when feeding, but not until after three hours when fasting. *M. persicae*, which did not feed readily on infected pea and broad bean, caused more infections than *A. fabae* and *Macrosiphum pisi* (least), which fed readily. Aphids fasted for 15 minutes or one hour after a 16-hour infection feed infected 41 and 50 per cent. of plants, respectively, compared with 25 per cent. when not fasted. There was no evidence of seed transmission from 1,365 germinated seeds. The dilution end-point of the virus was between $1:10^4$ and $1:10^5$ and the virus was still active after 72 hours' storage at room temperature, but not after 96.

Pea enation mosaic virus [loc. cit.; ibid., 28, p. 557], also obtained from naturally infected field plants, persisted in *M. pisi* and *Myzus persicae* for more than 140 hours and its transmission was unaffected by preliminary treatment of aphids. No transmission was obtained until at least four hours after they had left infected plants. The latent period usually exceeded one day and its duration was apparently unaffected by the length of the infection feeding.

SCHREIER (O.). **Das Auftreten wichtiger Krankheiten und Schädlinge an Kulturpflanzen in Österreich im Jahre 1950.** [The occurrence of important diseases and pests on cultivated plants in Austria in 1950.]—*PflSch. Ber., Wien*, 5, 11–12, pp. 386–396, 1950.

In this review of diseases and pests of economic plants in Austria, compiled from

records of many workers during the period January–October, 1950, the meteorological data are followed by lists of the agents concerned. The fungal and bacterial pathogens include *Pseudomonas medicaginis* var. [f.sp.] *phaseolicola* [C.M.I. map No. 85] on bean [*Phaseolus vulgaris*], the incidence of which was generally severe before the onset of the hot weather.

IWATA (Y.). **Specialisation in Pseudoperonospora cubensis (Berk. et Curt.) Rostow. I. Comparative studies on the pathogenicities of the fungi from Cucumis sativus L. and Cucurbita moschata Duchesne. II. Comparative studies on the morphologies of the fungi from Cucumis sativus L. and Cucurbita moschata Duchesne.**—*Ann. phytopath. Soc. Japan*, 11, 3, pp. 101–113, 1941; 4, pp. 172–185, 5 figs., 6 graphs, 1942. [Japanese, with English summaries. Received November, 1950.]

Field observations in Japan showed that squash (*Cucurbita moschata*) plants in plots adjoining cucumbers severely infected with downy mildew (*Pseudoperonospora cubensis*) [*R.A.M.*, 18, p. 86] remained healthy. Some spots and in one case sparse sporangia were produced on squash inoculated with the fungus from cucumber by placing drops of a sporangial suspension on the lower surfaces of the leaves. By this method and by atomizing with a suspension, the squash fungus produced fewer spots and sporangia on cucumbers than on squash. Sporulation on *Actinostemma lobatum* var. *racemosum* occurred only with the fungus from cucumber.

The morphology of the fungus was studied from fresh material collected in Tokyo and Tu and left in a moist chamber overnight. On both cucumber and squash the dimensions of the sporangia were smaller at low temperatures than at high, while the total length of the sporangiophore, the length and width of the main axis, and the number of branches were small at low temperatures, increasing as they rose, but becoming smaller again at high temperatures. The sporangia from squash were slightly larger than those from cucumber at each temperature tested, those from cucumber from Tu attaining their maximum lengths at 22° to 26° C. and those from squash at 14° to 18°; the mean measurements, however, were approximately equal. They were almost equally short at 11° and 30°. The sporangiophores from cucumber leaves collected in Tokyo were far larger than on those collected in Tu.

From the results of these experiments it is concluded that cucumber and squash are attacked by distinct biologic races of *P. cubensis*.

TAKIMOTO (S.). **On the Pythium causing damping-off of seedling and fruit rot of Cucumber.**—*Ann. phytopath. Soc. Japan*, 11, 2, pp. 89–91, 3 figs., 1941. [Japanese, with English summary. Received July, 1950.]

An apparently new fungus designated *Pythium cucurbitacearum* [without a Latin diagnosis] is characterized by hyphae 6 to 10 μ in diameter and frequently deformed in culture, the aerial hyphae being 4 μ; mostly spherical, papillate zoosporangia, 20 to 32 by 20 to 30 μ on the host plant and 12 to 15 by 10 to 13 μ on maize agar; oogonia 22 to 25 μ in diameter, and a basal, nearly spherical antheridium. It was isolated from damped-off seedlings of cucumber and oriental pickling melon (*Cucumis melo* var. *conomon*) in Hakuoka Prefecture and from watermelon, melon, and rag gourd (*Luffa aegyptiaca*) [*L. cylindrica*] fruits affected by soft rot at Taikyū, Tyōsen. The minimum, optimum, and maximum temperatures for growth were slightly below 10° C., about 33°, and slightly below 40°, respectively.

WALKER (J. C.). **Environment and host resistance in relation to Cucumber scab.** – *Phytopathology*, 40, 12, pp. 1094–1102, 2 figs., 1950.

In studies at the University of Wisconsin on the relation of environmental factors and host resistance to the epiphytology of cucumber scab (*Cladosporium cucumerinum*) [*R.A.M.*, 27, p. 109], confirmation was obtained of the findings of

Wiant [ibid., 17, p. 155], Pfältzer [ibid., 7, p. 6], and Van der Muyzenberg [ibid., 11, p. 690] as to the optimum growth of the pathogen on potato dextrose agar at 21° C. The optimum temperature for disease development, however, is about 17°. At and above 21°, in the susceptible varieties used, i.e., National Pickling, Chicago Pickling, Stays Green, and Ohio 31, the host rapidly cicatrizes the incipient lesions, so that little damage results. Epiphytotics occur only in those areas of Wisconsin where cool weather with frequent night fogs prevails after mid-season. Under such conditions the resistant Maine 2 develops delimited local lesions without the rapid stem invasion typical of the disease in susceptible varieties.

The maintenance of optimum temperature and humidity permits the division of resistant and susceptible plants into discontinuous classes at the young seedling stage [ibid., 18, p. 723]. By the use of this method, certain segregating hybrid progenies could be analysed with a high degree of accuracy, and their resistance and susceptibility were shown to be controlled by a single gene pair.

Berry Smith (F.). **Control of diseases and insect pests in the vineyard.**—*N.Z.J. Agric.*, 81, 4, pp. 321–330, 14 figs., 1950.

Descriptions are given of vine diseases occurring in New Zealand [*R.A.M.*, 7, p. 358], namely, downy mildew [*Plasmopara viticola*], *Oidium* [*Uncinula necator*: ibid., 11, p. 221], black spot or anthracnose [*Elsinoe ampelina*: cf. ibid., 30, p. 99], and *Botrytis* rot [*B. cinerea*], together with notes on their control.

Gaudineau (M[arguerite]). **Le mildiou de la Vigne — traitements et produits nouveaux.** [Vine mildew—new treatments and materials.]—Reprinted from *Bull. tech. Inform. Ingén. Serv. agric.* 49, 5 pp., 1950.

The author recapitulates the results of experiments carried out since 1941 at the South-western Centre for Agronomic Research, Grande Ferrade, on the efficiency of various products in preventing vine [downy] mildew [*Plasmopara viticola*: *R.A.M.*, 29, p. 286 and next abstract]. A 2 per cent. Bordeaux mixture [ibid., 25, p. 488] is considered adequate and when the attacks are slight or late the dosage may be reduced to 0·5 or 1 per cent. Cuprammonia, colloidal copper, and certain organo-mercury and organo-zinc compounds should be used only as intercalary treatments when copper sulphate is scarce. Oxychloride or oxides containing 50 per cent. copper gave a degree of protection to the leaves comparable with that of Bordeaux mixture having the same copper content. Their efficacy in severe attacks on the grapes themselves, however, has yet to be determined.

Galet (P.). **Observations sur la résistance aux maladies des hybrides producteurs cultivés à l'école de Montpellier.** [Observations on the disease resistance of the bearing hybrids grown at the Montpellier school.]—*Progr. agric. vitic.*, 133, 21–22, pp. 300–307; 23–24, pp. 325–330; 25–26, pp. 353–358; 142, 27–28 (Edition de l'est-centre), pp. 11–15; 134, 29–30, pp. 50–53, 2 graphs, 1950.

During autumn, 1949, observations of the disease resistance of 600 hybrid vines were made at the School of Agriculture, Montpellier. The vines in each of the 12 collections studied could be divided into four groups according to their reaction, chiefly to mildew [*Plasmopara viticola*: *R.A.M.*, 29, p. 197 *et passim*] and also to *Oidium* [*Uncinula necator*: ibid., 29, p. 286] and brown rot [? *Guignardia bidwellii*: ibid., 26, p. 228]. The number of sulphur treatments required according to the susceptibility is prescribed.

Strains in group I have a resistance equal or superior to 15/20 and require no fungicidal treatment under normal conditions. They include 12 Couderc, 114–12 Galibert-Coulondre, 26–627, and 26–649 J. Seyve, 595 Oberlin, 9249 Siebel, and 18–315 S. Villard.

Müller-Stoll (W. R.). **Die Bedeutung des Regen- und Wärmeklimas für die Epidemiologie und Bekämpfung der Rebenperonospora in den südwestdeutschen Weinbaubezirken.** [The importance of wet and mild climates in the epidemiology and control of the Vine *Peronospora* in the German south-western Vine districts.]—*Z. PflKrankh.*, 57, 5–6, pp. 161–171, 4 graphs, 1950.

A survey from 1930 to 1938 showed that in the vine districts of Baden, Germany, the high rainfall (90 to 100 mm. monthly average from May to October in Oberbaden) and relatively long springs favour the development of vine downy mildew (*Plasmopara viticola*) [*R.A.M.*, 27, p. 217], and severe early primary infections often develop. Under such conditions two pre-blossom and two post-blossom sprays are necessary. The first application must be given mostly at the end of May, before the first attack becomes general. Delaying the first spray as is done in other districts makes control ineffective. In rainy weather during the flowering stage an extra spray into the blossom is advised and is not harmful.

Smolák (J.). **K virosám našich rostlin.** [On the viroses of our plants.]—*Ochr. Rost.*, 21, 3–4, pp. 29–34, 5 figs., 1948. [English summary. Received July, 1950.]

Descriptions are given of the following virus diseases found in Czechoslovakia in 1947 and 1948, some of which were noticed for the first time. Mosaic occurred on kohlrabi seedlings [cf. *R.A.M.*, 19, p. 508]. After the initial paling of the margins the whole leaf blade and petioles turned white. A leaf chlorosis was found on bird cherry (*Prunus padus*) at Hamry nad Nežárkou. Often only a lateral half of the lamina showed mosaic symptoms. Yellows was observed on the cultivated medicinal herb *Levisticum officinale*. Virus diseases in Czechoslovakia are increasing on various hosts.

Fernandez Valiela (M. V.). **Los virus de las plantas y la agricultura.** [Plant viruses and agriculture.]—*Inf. Direcc. Invest. agríc., B. Aires*, 3, 28–29, pp. 17–24, 11 figs., 1950.

A summary of the available information on a number of important virus diseases affecting agricultural crops in Argentina is supplemented by some general observations on the propagation of viruses, the economic significance of insects as carriers, various methods of recognition of viruses as agents of disease, some properties of viruses, control measures, and viruses in relation to agriculture. The diseases comprised in the review are tomato spotted wilt on potato and tomato [*R.A.M.*, 26, p. 97; 28, p. 36], potato leaf roll, virus X, and virus Y on potato [ibid., 17, p. 266; 25, p. 468]; 'tristeza' root rot of citrus [ibid., 30, p. 266]; viruses of sugar beet [ibid., 20, p. 106], including a suspected strain of virus yellows [ibid., 26, p. 576]; and sugar-cane mosaic [ibid., 29, p. 501].

It is estimated that *Frankliniella* [*paucispinosa*], in its capacity as vector of tomato spotted wilt virus, reduces the Argentine tomato crop by 50 per cent. In the south-west of the province of Buenos Aires the incidence of infection by this virus on potatoes may reach 100 per cent., especially towards the end of the season. In the Delta del Paraná, too, the late varieties sustain comparable damage, coinciding with the period of diffusion of the vector, whereas the early crop escapes infection altogether.

Walters (H. J.). **Grasshopper transmission of three plant viruses.**—*Science*, 113, 2924, pp. 36–37, 1951.

Greenhouse transmission experiments were carried out at the University of Nebraska using single adult grasshoppers (*Melanoplus differentialis*) [*R.A.M.*, 10, p. 617] and infected tobacco plants as a source of tobacco mosaic virus, potato virus X, and tobacco ring spot virus. Feeding times of 1 to 2, 15, and 30 min.

were allowed for transmission tests with tobacco mosaic made immediately, after 2 and 4 hours, and after 12 and 24 hours, respectively. Each insect was moved to a fresh location on the test plant (a tobacco × *Nicotiana glutinosa* hybrid) after making a few bites or a hole 1 to 6 mm. in diameter in the leaf, and was allowed only two feedings at different locations in the tests made immediately after feeding and after the 2- and 4-hr. waiting periods. The insects tested after a 12-hr. waiting period were allowed to feed at approximately ten different locations. Sixty-four per cent. of those tested after 24 hours were allowed to feed at two locations and 36 per cent. at ten. Twenty-two of 75 insects tested immediately after feeding produced 28 local lesions on 22 plants. Seven out of 15 insects tested after 2 hours' wait transmitted the virus; 10 out of 34 produced 12 local lesions after 4 hours; 2 out of 21 transmitted after 12 hours; while no transmission occurred after the 24-hour waiting period.

In another experiment individual infective grasshoppers were allowed to feed for a series of 18 periods, one on each half of 9 leaves. Forty out of 48 insects transmitted the virus, producing 96 local lesions in all.

Twenty single grasshoppers were fed on the virus source for 5 minutes and transferred immediately to individual hybrid plants for 17 hours. Ten insects transmitted the virus, producing 15 local lesions altogether.

Single infective grasshoppers were allowed to feed about ten times at different locations on individual healthy tobacco plants. Fifty-seven of the 104 insects tested transmitted mosaic, causing systemic infection; 9 out of 20 transmitted after 2 hours, and 9 out of 21 caused systemic infection after 4 hours.

Tobacco was used as the test plant for the transmission of potato virus X and tobacco ring spot virus. Single insects were transferred to individual healthy plants immediately after infective feeding and were allowed to feed 6 to 8 times at different locations. Local infection appeared within 5 to 6 days. Eighteen out of 100 grasshoppers transmitted potato virus X to tobacco plants which developed local lesions and later systemic infection. Only six out of 100 insects transmitted tobacco ring spot.

Roberts (F[lorence] M.). **The infection of plants by viruses through roots.**—*Ann. appl. Biol.*, 37, 3, pp. 385–396, 1950.

In experiments carried out at Rothamsted, when the roots of ten Majestic potato plants grown in soil were sap-inoculated with potato virus X by abrasion, nine developed root infection in six weeks, but only one had the virus in the top. Sixteen young tomato plants inoculated with tobacco mosaic virus were infected in both roots and tops after five weeks. Another group of 16 plants were inoculated with a mixture of this virus and potato virus X. The latter reached the tops of seven of eight plants inoculated in the fibrous roots, and tobacco mosaic three. Virus X reached the tops of all those inoculated in the tap root and tobacco mosaic virus the tops of six. When tomato seedlings were grown in culture solution and inoculated [? with tobacco mosaic virus] in the upper tap root, lower tap root, or two horizontal surface roots, the tops of two in each of the first two groups contained the virus 16 days later and seven in the third group. In a second experiment three groups of 14 plants each were inoculated with tobacco mosaic, tomato bushy stunt, and potato X^y viruses, respectively. The numbers with virus in roots and leaves were for the three viruses, respectively, 2 and 5, 0 and 2, and 4 and 4. The virus movement in young tomato plants which were root-inoculated with virus X^y varied in two tests. In some cases the virus was found in the uninoculated portion of the root. Most of the detached tops which were inoculated on the cut surface and kept in culture solution had foliage symptoms within 2 to 3 weeks. In both tomato and potato spread of virus X^y from diseased to healthy plants growing in the same culture solution occurred only if their roots were in contact. Of 100 plants growing in

solution inoculated from containers with virus X diseased plants none became infected and the solution was never found to be infective. Injuring diseased and healthy plants did not have any affect. In all experiments when infected sap was added to culture solution usually about 10 per cent. of the plants became infected [*R.A.M.*, 29, p. 246].

Wahlin (B.). **Parasitangrepp på lantbruksväxter i Ostergötland och Norra Kalmar län 1950.** [Parasitic infection of agricultural crops in East Gothland and the North Kalmar district 1950.]—*Växtskyddsnotiser, Växtskyddsanst., Stockh., 1950*, 6, pp. 71–76, 1950.

In general, the plant disease situation in East Gothland [cf. *R.A.M.*, 29, p. 249] and the North Kalmar district of Sweden in 1950 presented no remarkable features. Mention may be made, however, of the alarmingly high incidence of loose smut of oats (*Ustilago avenae*) in several localities. The attention of growers should be directed to black leg of potatoes (*Erwinia phytophthora*) [*E. carotovora*], which was also reported from various quarters, sometimes in a serious form.

Nilsson (L.). **Några växtsjukdomar i Skåne 1950.** [Some crop diseases in Scania 1950.]—*Växtskyddsnotiser, Växtskyddsanst., Stockh., 1950*, 5–6, pp. 79–82, 1950.

The following were among the plant diseases occurring with exceptional severity or in an unusual form in Scania, south of Sweden, during 1950 [cf. *R.A.M.*, 29, p. 248]. Attacks of *Septoria graminum* [*S. tritici*: ibid., 25, p. 155] imparted a yellow colour to many young wheat crops in April. No reports of serious damage were received, the plants having apparently outgrown the infection. An uncommon feature of the outbreak of mildew (*Erysiphe graminis*) on wheat during a very wet spell at the end of June was the abundance of mycelium on the leaf blades, which in conjunction with sooty moulds, such as *Alternaria* and *Cladosporium* spp., lent a grey appearance to the fields.

The incidence of club root (*Plasmodiophora brassicae*) appears to be increasing on rape [ibid., 29, p. 249], possibly owing to the accumulation of infective material in the soil resultant on the intensive cultivation of the crop.

A. linicola was general on flax [loc. cit.], but further studies are necessary to determine the degree of its pathogenicity, most of the infected plants having apparently been already weakened by other causes.

As in Denmark (*Maanedl. Overs. Sygd. Kulturpl., 1950*, 310, 311, 1950), *Monilia* [*Sclerotinia*] *laxa* was responsible for exceptionally heavy damage to apple twigs and blossoms in Scania.

Nursery plants of *Viola cornuta* were severely attacked by *Tuburcinia* [*Urocystis*] *violae* [*R.A.M.*, 5, p. 34].

Didymosphaeria populina caused shrivelling and blackening of young poplar shoots [ibid., 11, p. 137], the tissues of which contained numerous perithecia.

Report of the Associate Committee on Plant Diseases of the National Research Council and the Dominion Department of Agriculture.—*Nat. Res. Coun. Rev., 1950*, pp. 231–237, 1950.

Research carried out during 1949 at the University of Alberta under the direction of A. W. Henry [cf. *R.A.M.*, 29, p. 141] included further work on antibiotics Nos. 1 and 2 isolated from *Bacillus subtilis* A 32 [ibid., 27, p. 357; cf. 30, p. 59]. Both inhibited species of *Xanthomonas* to the same degree. *X. barbareae* [ibid., 28, p. 56] was the only one that was not inhibited on nutrient agar.

In further work on the germination of sclerotia of *Claviceps purpurea* [ibid., 29, p. 330; 30, p. 111] those buried ½ in. deep outdoors from September 3rd, 1948, to June 10th to 15th, 1949, gave 98·5 per cent. germination. Sclerotia buried for two years in soil at depths of 3 to 24 in. were badly decomposed. The best germination

in the laboratory was obtained at 10° to 20° C., while none occurred at 5° and 25°. Only 7 per cent. germinated in soil having a 10 per cent. moisture content and none in wet or saturated soil.

In pathogenicity tests at the University of Saskatchewan, directed by T. C. Vanterpool, with strains of *Rhizoctonia* [*Corticium*] *solani* [ibid., 30, p. 319], cereals tended to be considerably more resistant than flax, legumes, and grasses. The cultural characteristics of some strains have changed with continuous subculturing although their pathogenicity has remained virtually constant. No high degree of varietal resistance of flax to two virulent strains of *C. solani* was indicated in either field or greenhouse experiments. Dakota was definitely the most resistant and Redwing the least, with Rocket and Royal about equal in between. Greenhouse tests indicated that packing the soil at the time of sowing flax reduces the amount of seedling blight in medium-textured soil. In 1948 *C. solani* was one of the chief fungi associated with late root rot of flax.

Twenty-fourth Annual Report of the Department of Scientific and Industrial Research, New Zealand, 1950.—112 pp., 1950.

Reporting the work of the Plant Diseases Division (pp. 63–70) [cf. *R.A.M.*, 30, p. 19] G. H. Cunningham states that trials with Improved Bay State tomatoes in the four main glasshouse areas in New Zealand have confirmed its resistance to leaf mould [*Cladosporium fulvum*: loc. cit.]. Seed extraction with 1·6 per cent. hydrochloric acid destroyed the tomato canker organism [*Corynebacterium michiganense*: ibid., 28, p. 37]. Infection on dry seed was eliminated by treatment for 24 hours with 5 to 8 per cent. hydrochloric acid or 1 in 2,000 acidulated mercuric chloride without loss of germinating capacity.

The linseed and linen flax varieties Ottawa 770B (C.I. 355), Argentine Selection (C.I. 462), B5128, Tammes Pale Blue (C.I. 333–1), and Marye (C.I. 112) were highly resistant to rust [*Melampsora lini*].

Of 14 linseed crops infested with browning [*Polyspora lini*: ibid., 30, p. 20], which is confined to Otago and Southland, four were moderately and three slightly infected, and seven had only a trace. In central and south Canterbury 35 crops were infected with pasmo [*Sphaerella linorum*], eight severely, 10 moderately, one slightly, and 16 with a trace.

In field and glasshouse trials 10 garden pea and four field pea varieties were resistant to wilt (*Fusarium orthoceras* var. *pisi*) [cf. ibid., 28, p. 43]. Of 121 pea crops in the Auckland, Marlborough, and Canterbury districts surveyed in November and December, 1949, 67 were infected with collar rot [*Ascochyta pisi*, *A. pinodella*, and *Mycosphaerella pinodes*: see below, p. 400], losses in severely infected areas ranging from 25 to 75 per cent.; 20 were infected with wilt, which was most severe in Canterbury; 50 with downy mildew [*Peronospora viciae*: ibid., 26, p. 1], 49 having slight infection; 16 with *Septoria* blotch [*S. pisi*: ibid., 21, p. 238; 22, p. 335], mainly in the Auckland district; and one severely infected with foot rot [*M. pinodes*, *A. pinodella*, and *Fusarium* spp.] in the Auckland district.

Plum mosaic is widespread and it is suggested that it might be eliminated from nurseries by roguing and the selection of budwood from healthy trees.

Verticillium dahliae [ibid., 30, p. 332] was isolated for the first time from peaches in Hawke's Bay and Central Otago, and plums in Hawke's Bay.

Used for the control of apple fireblight [*Erwinia amylovora*], low concentrations ($\frac{1}{2}$–1–100 and 2–4–100) of Bordeaux mixture applied at open cluster and full bloom caused negligible russeting on Granny Smith and Dunn varieties and slight damage on Sturmer. Marked russeting followed petal-fall applications and after 6–8–100 Bordeaux under all conditions. Bordeaux applied to blight-infected cider apples during blossoming gave some control of blossom infection.

Bacterial soft rot [? *Erwinia carotovora*] of carrots was controlled satisfactorily

by dipping roots in Bordeaux, perenox, cuprox, copper sandoz, or zeolite. Only six of 33 lines of lettuce seed tested were free from lettuce mosaic virus. Infection in the remainder ranged from 0·6 to 9·4 per cent. The host ranges of cucumber mosaic and tomato spotted wilt viruses now include anemone and sweet pea, respectively.

Auchincruive Climax, Oberschlesien, Ettesburg, and Chapman's seedling strawberries all proved resistant to *Phytophthora fragariae*.

Wound and surface inoculations of young Lawson's cypress [*Chamaecyparis lawsoniana*] with *Coryneum cardinale* [ibid., 27, p. 545] isolated from infected nursery trees caused severe gummosis with death of branches above inoculation points after nine months.

Crown galls [*Bacterium tumefaciens*] on marigold [? *Tagetes erecta*] and peach seedlings were destroyed by elgetol, iodine, and clove oil [see below, p. 373].

In glasshouse therapeutant tests against tomato blight [*Phytophthora infestans*] it was shown that various copper zeolites have high fungicidal values and are resistant to weathering, which reduces the efficiency of copper oxychlorides; adhesives such as polyethylene polysulphide markedly improved the weathering properties of copper fungicides, but none of the materials tested equalled Bordeaux mixture.

Dichloronaphthoquinone gave the best results against peach brown rot [*Sclerotinia fructicola*: ibid., 28, p. 378] and applications (1 lb. to 2 lb. to 100 gals.) at blossoming increased crop yield. Pre-harvest sprays prevented storage rot to a large extent but caused grey skin blemishes on Golden Queen and to a lesser extent on Paragon.

Control of apple black spot [scab; *Venturia inaequalis*: ibid., 30, p. 177] was better with sprays based on phenyl mercury ammonium lactate and phenyl mercury chloride, and with ferbam and thiram, than with standard sulphur sprays. Ferbam and thiram caused less foliage damage. Numerous isolations from New Zealand flax (*Phormium* [*tenax*]) affected with yellow leaf disease, and pathogenicity tests have given no indication that fungi or bacteria are involved. Other tests are in progress.

Annual Report, Cawthron Institute, Nelson, New Zealand, 1949–50.—46 pp., [? 1950].

In this report [cf. *R.A.M.*, 30, p. 21 and preceding abstract] the results of a survey of the boron content of raspberry leaves from various localities revealed that those from gardens badly affected with die-back [ibid., 30, p. 22] gave figures of 20 to 29·3 p.p.m. compared with 40 to 58·5 for healthy plants. Water soluble boron in the soil of affected gardens was usually less than 0·25 p.p.m. At Tadmor and Motupiko borax applications were again beneficial. Further applications of dolomite and magnesite in September, 1949, to apple experiment plots at Tasman and lower Moutere gave very beneficial effects on foliage, indicating that on these soils more frequent applications of magnesium compounds are necessary for vigorous, healthy trees.

The fungus most frequently isolated from Cox's Orange apple trees affected with die-back in an orchard at Redwood's Valley and one at Mapua was *Coriolus* [*Polystictus*] *versicolor*, followed by *Stereum purpureum* and *Physalospora obtusa* [cf. ibid., 26, p. 230; 28, p. 4]. *Verticillium* (usually *V. dahliae*) [ibid., 19, p. 70] was frequently present in the roots and stems of gooseberry plants affected with die-back in the Stoke and Richmond areas.

Hop black root rot (*Phytophthora* sp.) was the most common disease noted in 48 commercial gardens examined, but the Wai-iti-Wakefield gardens appeared relatively unaffected. Control of the disease in hop cuttings in their second year in experimental plots was effected best by DD [ibid., 30, p. 287], followed by chloropicrin. In the majority of first-year plants DD and calcium cyanamide gave the best growth No sign of bud or shoot burning resulted from the use of fungicides

for treating open hop crowns when exposed at pruning time. The best early growth followed zinc oxide and the poorest Bordeaux mixture, the latter causing poorer growth than the untreated later in the season. The results of basal inoculation with *Phytophthora* sp. of cuttings of hop varieties were in agreement with the growers' experiences that Fuggle and Bumford are resistant and Grape and California susceptible. *Phytophthora* sp. grew well at pH values ranging from 4·75 to 6·4 (maximum growth between 6·0 and 6·4).

Tobacco mosaic infections in 23 gardens were 17 per cent. in 1948–9 and 15·7 per cent. in 1949–50, but the infected plants in the latter season were more extensively damaged. The percentage of mosaic in plants grown from direct seeding was 9·3 compared with 22·2 for pricked out plants [cf. ibid., 30, p. 21]. Stem canker occurred in several gardens and appears to be extending. Of 50 weed species tested for susceptibility to tobacco black root rot [*Thielaviopsis basicola*] *Alchemilla arvensis*, wild carrot, suckling clover, daisy (*Bellis perennis*), and dwarf mallow [*Malva rotundifolia*] were all either seriously or moderately affected. Chloropicrin (4 or 6 ml. per sq. ft.) reduced heavy root rot infection in tobacco seedlings from 83 to 8 per cent.

Wheat, barley, oats, rye-corn, vetch, blue lupins, and rye grass [*Lolium perenne*], which might be used as green manures, were practically free from infection when grown in soil badly infested with the *Verticillium* wilt organism [*V. albo-atrum*]. Seedling [tobacco] plants grown in beds steam sterilized to kill the collar rot (*Sclerotinia* [*sclerotiorum*]) sclerotia were 94 per cent. healthy compared with 42 per cent. in beds without steam treatment.

Katznelson (H.). **The detection of internally-borne bacterial pathogens of Beans by a rapid phage-plaque count technique.**—*Science*, 112, 2918, pp. 645–647, 1950.

In studies at the Department of Agriculture, Ottawa, the following rapid phage-lysis method [cf. *R.A.M.*, 30, p. 313] was evolved for the detection of internal infection of bean [*Phaseolus vulgaris*] seed by *Pseudomonas* [*medicaginis* f.sp.] *phaseolicola* and *Xanthomonas phaseoli* [ibid., 29, p. 600; 30, p. 291]. A mixture consisting of 50 surface-sterilized bean seeds washed and ground in 250 ml. sterile nutrient broth was retained overnight at room temperature. After shaking, 10 ml. of the supernatant were transferred aseptically to a sterile flask to which 1 ml. of a suitable dilution of phage (containing mostly 4,500 virus particles) was added. Typical phages for both organisms were isolated from a mixture of soil, compost, and sewage. Plates were poured immediately with 0·1 ml. of this mixture, 0·6 ml. of a nutrient broth bacterial suspension from a 24-hr. slant culture, and 10 ml. yeast-beef agar. Plaques were counted after 5 to 8 hours at room temperature. Further samples of 0·1 ml. or smaller amounts were plated from the flask after 5 to 6 hours and the plaques counted after 5 to 8 hours. Thus, if a number of the pathogenic organisms are present in a macerated bean sample and if a known number of phage particles are added to a given volume of this sample a significant increase in the number of phage particles should occur after a suitable interval under favourable conditions. This theory is based on the well-established fact that one susceptible bacterial cell infected with one phage particle may liberate 20 to 100 particles or more, depending on the bacterial species and the conditions of growth. By this procedure 0·1 ml. of the phage-bean mixture gave about 20 to 40 plaques per plate at zero time and usually from 20 to 100 times that number after 5 to 6 hours if the host cells were present.

The phages used lysed all strains tested of the two species but of no other species in the same genera; for example, the phage for *X. phaseoli* did not lyse its varieties *fuscans* or *sojense*. So far only the bacterial isolates from samples susceptible to lysis have proved pathogenic to bean seedlings. The size of the seed sample was

found to be of great importance. When heavily infected 50 seeds are sufficient, but for lightly infected ones 200 or more may be required. In *P.m.* f.sp. *phaseolicola* at least, resistant strains do not appear to be a serious obstacle to obtaining positive results.

Ekstrand (H.). **Utvintringsvampar och vinterskador på höstsäd och vallar i Norge.** [Winter-killing fungi and winter injury to autumn cereals and pasture crops in Norway.]—*Växtskyddsnotiser, Växtskyddsanst., Stockh., 1950*, 5–6, pp. 87–91, 1950.

In May, 1950, the author visited Norway to study the position with regard to fungal and other forms of winter injury to cereals and pasture crops. As in Sweden [*R.A.M.*, 30, p. 44], the conditions of the preceding winter favoured infection by the snow mould (*Fusarium*) [*Calonectria nivalis*], which originated mainly in the soil. Other fungi concerned in the reduction of cereal and grass stands were *Sclerotinia borealis*, *Typhula borealis*, and *T. itoana* [loc. cit.].

S. trifoliorum [ibid., 29, p. 565] and *T. borealis* were observed on clover. According to [H.] Røed, devastating outbreaks of the former pathogen occurred in the south-west, but the damage from this source in south and north Tröndelag appeared to be negligible.

Holton (C. S.) & Lowther (C. V.). **Heritability of number of primary sporidia produced by spores of Tilletia caries and T. foetida.**—*Phytopathology*, 41, 2, pp. 172–177, 1951.

There were differences in the number of primary sporidia produced by monosporidial isolates of races T–9 and C.T. 13 of *Tilletia caries* and L–1 and L–9 of *T. foetida* [cf. next abstract] at the Washington Agricultural Experiment Station [*R.A.M.*, 30, p. 29], the mean numbers at 12° to 18° C. among the four races ranging from 6·7 to 12·9. Evidence from hybrids between these races indicates that the number of sporidia produced by different races, like other racial features [ibid., 23, p. 477], is a heritable character, but the mode of inheritance has not yet been demonstrated, while the facts regarding dominance and the number of genetic factors involved are conflicting.

Further difficulties are presented by a genetic interpretation of the F_2 population, since there was no specific pattern of segregation and recombination of factors. Most of the segregates from hybrids between T–9 and C.T. 13 produced large numbers (10 and upwards) of sporidia, like the T–9 parent, a few gave rise to intermediate numbers, while the sporidia from at least two were more numerous than those of the T–9 parent (means of 22·8 and 18·9).

Pugsley (A. T.). **The resistance of Oro and Orfed Wheats to Tilletia caries and Tilletia foetida.**—*Aust. J. agric. Res.*, 1, 4, pp. 391–400, 1 pl., 4 graphs, 1950.

In further investigations at the Waite Agricultural Research Institute, Adelaide, from 1944 to 1949 [cf. *R.A.M.*, 29, p. 150] the resistance of Oro and Orfed [ibid., 24, p. 309; 30, p. 54] wheats to race T.5 of *Tilletia caries* and races L.1, L.14, and L.3 of *T. foetida* [cf. preceding abstract] was studied [ibid., 30, p. 221]. Rapier and Dirk, respectively, were used as the susceptible parents. The frequency distribution of bunt infection in segregating F_3 populations from Oro × Rapier indicated that inheritance was not simple, this being confirmed by the selection of several strains exhibiting marked differential reactions to each physiologic race. Some selections remained resistant to all four races and even appeared to be more resistant to races L.3 and T.5 than Oro itself. All five selections from Orfed × Dirk were resistant to races L.1 and L.14 and two were resistant to T.5 and L.3.

Giorgio (V.). **Prova di inoculazione biologica di ecidioconidi di Anchusa undulata su Segala.** [Proof of the biological inoculation of aecidiospores from *Anchusa undulata* to Rye.]—*Boll. Staz. Pat. veg. Roma*, Ser. 3, 6, pp. 181–183, 1948 (issued 1950). [English summary. Received February, 1951.]

When aecidiospores of *Puccinia dispersa* [cf. *R.A.M.*, 27, pp. 114, 127; 28, pp. 57, 619, *et passim*] from *Anchusa undulata* plants growing in the provinces of Frosinone and Viterbo, Italy, were used to inoculate rye seedlings [cf. ibid., 4, p. 160] in experimental plots at the Plant Pathology Station, Rome, typical uredosori developed.

Biraghi (A.). **Osservazioni e considerazioni sul disseccamento batterico del Granoturco (Xanthomonas (Aplanobacter) stewarti) in Italia.** [Observations and considerations on bacterial wilt of Maize (*Xanthomonas* (*Aplanobacter*) *stewarti*) in Italy.]—*Boll. Staz. Pat. veg. Roma*, Ser. 3, 6, pp. 9–18, 1948 (issued 1950). [English summary. Received February, 1951.]

This is a reprint of a paper already noticed from another source [*R.A.M.*, 28, p. 282].

Lamour (R.). **Viroses des Agrumes en Afrique du Nord.** [Virus diseases of Citrus in North Africa.]—*Fruits & Primeurs*, 20, 220, pp. 381–384, 1950.

Virus diseases are very prevalent in the citrus orchards of the plain of Mitidja [Algeria] and are spreading on certain late varieties. They include psorosis A [*R.A.M.*, 29, pp. 97, 152], concave gum psorosis, and blind pocket psorosis [cf. ibid., 30, p. 34], but quick decline [cf. ibid., 29, p. 617] seems to have disappeared from this region. Two diseases in particular present very striking features. One, not very common at present, affects the 'Mbaradja' blood orange. The trunk is compressed transversally, the flattening almost always affecting the part facing south-west. The branches are dwarfed and resemble a string of sausages. Such branches are numerous and tend to grow horizontally; the foliage has a characteristically bushy appearance. The fruits are small to medium and display one to four grooves running outwards from the peduncle. The pulp is bitter and not very juicy, and yield is reduced. If the trees are regrafted on to navel or Portuguese orange the volume of the tree and the yield are often doubled.

The second disease is becoming progressively more prevalent. One or more variously shaped depressions occur on the fruit surface of several varieties, including Jaffa. These depressions are not found every year on any one tree but some trees show 60 per cent. affected fruits. Young green fruits, which fall in June, are frequently affected. The colour of the skin is affected, especially in blood oranges, and the skin is sometimes so rough that the oranges are graded as 'defective'.

The author recommends that a North African Station of Genetics should be established to supply stocks to growers, ascertain whether sour orange is the best stock for local needs, and attempt by periodical selection of nucellar lines to rejuvenate the North African orchards.

Martin (J. P.). **Effect of soil fungi on germination of Sweet Orange seeds and development of the young seedlings.** *Proc. Soil Sci. Soc. Amer.*, 14, pp. 184–188, 2 figs., 1950.

In further work on the fungus flora in Californian citrus soils [cf. *R.A.M.*, 28, p. 62; 29, p. 557] *Fusarium solani*, *Pyrenochaeta* sp., and fungus D 1 were found in greater concentration in old citrus soils than in non-citrus. These and other fungi isolated from the root zone of citrus trees were tested on germinating sweet orange seeds and young seedlings. A sterile medium of quartz sand and ground citrus

roots (200:2) moistened with nutrient solution and inoculated with the fungus was used.

F. solani, *F. oxysporum*, and *Cylindrocarpon radicicola* caused decay of some of the seeds and injured the root tips of most of the seedlings. *F. solani* and *Pyrenochaeta* sp. together inhibited germination and caused decay of all except one of 60 seeds tested. *Aspergillus ochraceus*, *Stemphylium piriforme*, and *Thielaviopsis basicola* tended to reduce root growth and cause enlargement of the root tips.

The results support the view that poor citrus growth in old citrus soils is partly due to the establishment of a harmful fungal population in the soil [loc. cit.].

PONTIS [VIDELA] (R. E.). **A canker disease of the Coffee tree in Colombia and Venezuela.**—*Phytopathology*, 41, 2, pp. 178–184, 2 figs., 1951.

A canker disease of coffee trees in Colombia and Venezuela, known locally as 'llaga macana' [sabre wound], is the cause of widespread economic loss in production. It is believed to be identical with the 'canker' reported by Zimmermann from Java in 1900 (*Bull. Inst. bot. Buitenz.*, 4, pp. 19–22) and assigned by him to *Rostrella coffeae*.

The first symptom noticeable from the edge of an affected planting is the faded appearance of the foliage, which turns progressively from yellowish-green to yellow. Brown to black, irregularly shaped lesions or cankers of variable size are revealed by scarification of the outer surface of the trunk or main branches of trees upwards of eight to ten years old. The progress of the disease is slow, movement being more rapid downwards than upwards. Penetration is only superficial and the wood is rarely stained at a depth exceeding 2 cm. With the extension of the cankers and subsequent necrosis of the affected tissues complete girdling of the limb or trunk finally ensues, though this process is usually preceded by the vigorous growth of a new shoot some distance below the lesion.

Morphological and cultural studies on the fungus isolated from cankers in two Colombian plantations led to its identification with *Ceratostomella fimbriata* [*R.A.M.*, 12, p. 650; 16, p. 494], and this diagnosis was confirmed by H. A. Dade of the Commonwealth Mycological Institute. Inoculation experiments with the pathogen on coffee trees, using Klotz and Fawcett's method [ibid., 10, p. 98], resulted in the development of typical symptoms and the recovery of the causal organism. A species of *Fusarium* occasionally isolated from the cankers proved to be non-pathogenic. Evidently, therefore, *C. fimbriata* is the agent of the coffee canker and *R. coffeae* should be relegated to synonymy. Negative results were given by tests for pathogenicity to coffee of *C. fimbriata* from sweet potato [ibid., 30, p. 190] and the related species *C. pilifera* and *Thielaviopsis* [*C.*] *paradoxa*.

THOMAS (K. M.). **Second Annual Report of the Research Department of the Indian Coffee Board (1948–49).**—*Bull. Res. Dep. Indian Coffee Bd* 2, 54 pp., 1950. R.1.

In the section of this report [cf. *R.A.M.*, 29, p. 210] dealing with plant pathology (pp. 37–40) it is stated that the addition to Bordeaux mixture (2–2–40) of teepol X (linseed oil) spreader ($\frac{1}{2}$, $1\frac{1}{2}$, and 3 oz. per 40 gals., printed wrongly in the last report as $\frac{1}{4}$, $\frac{1}{2}$, and $\frac{3}{4}$ oz.) helped leaf retention [in the control of coffee leaf disease, *Hemileia vastatrix*], as shown in all observations made in September, 1948, although there was no corresponding increase in yield figures for 1949. Two sprays per year of perenox (1, $\frac{3}{4}$, and $\frac{1}{2}$ lb. in 40 gals.) were equal to Bordeaux mixture in aiding leaf retention in three out of six observations from 1946 to 1949, while the 1949 yields of the Bordeaux-sprayed plants were superior to all three strengths of perenox. An analysis of spraying results indicates that locality and season are important influences of the effects of time of application and strength of mixture.

Two experiments were made at Byneheddal to study the effects of handling coffee bushes (i.e. removing debris of previous infection from the crowns) and spray-

ing them before and during the monsoon against black rot (*Corticium koleroga*). The results showed that Bordeaux applied during the monsoon could arrest disease spread. Handling without spraying reduced the source of infection by contact but did not protect against further disease development. *Coffea stenophylla*, *C. arabica*, *C. quillou*, *C. abeokutae*, *C. excelsa*, *C. liberica*, and *C. arabica* (Baramasi) were resistant to black rot at the Station, *C. robusta* was moderately susceptible, and *C. bengalensis*, *C. zanquebariensis*, and *C. eugenoides* were very susceptible.

Gubanov (G. Ya.). Нарушение углеводного обмена под действием таннидов у пораженного вилтом Хлопчатника. [Disruption of the carbohydrate metabolism in wilt-infected Cotton under the influence of tannin.]—*C. R. Acad. Sci. U.R.S.S.*, N.S., 71, 3, pp. 565–568, 1950.

Studies at the Pan-Scientific Cotton Institute, U.S.S.R., demonstrated that the disruption of the carbohydrate metabolism in cotton plants infected with wilt (*Verticillium albo-atrum* and *V. dahliae*) [*R.A.M.*, 30, p. 270] is connected with the increased accumulation of tannin in the tissues. The action of amylases is increased.

Blank (L. M.) & Leyendecker (P. J.). **Verticillium wilt spread to disease-free soil by infected Cotton stalks.**—*Plant Dis. Reptr*, 35, 1, pp. 10–11, 1951. [Multilithed.]

At the New Mexico Agricultural Experiment Station dead cotton stalks infected with *Verticillium* wilt [*V. albo-atrum*: *R.A.M.*, 30, p. 37] were ploughed into plots, on which no cotton had been grown for 25 years, at the beginning of each month from December, 1949, until April, 1950. Texacala cotton seed (produced in a disease-free area) was sown on 20th April after irrigation. The first symptoms of wilt appeared early in July. The final percentages of wilted plants ranged from 83 to 99 with a yield of 1,637 lb. seed cotton per acre, while four of five untreated plots remained free from infection (the fifth contracting 2 per cent. wilt), with a yield of 2,686 lb. The reduction in yield of lint cotton per acre due to wilt amounted to 398 lb.

Apparently the current practice of turning under of cotton stalks has contributed to the build-up of inoculum in the soil. In severely infested fields the destruction of diseased stalks would probably remove only a part of the potential inoculum, whereas in those with little infection the removal of diseased plants during the growing season appears advisable [cf. ibid., 30, p. 156].

Allen (R. M.). **Cotton seeds are capable of carrying Verticillium.**—*Plant Dis. Reptr*, 35, 1, pp. 11–12, 1 fig., 1951. [Multilithed.]

In March, 1950, at the Agricultural Experiment Station, Tucson, Arizona, surface sterilized cotton seeds of S × P variety were soaked in sterile distilled water, hypodermically inoculated with a pure culture of *Verticillium albo-atrum* [see preceding abstract], and placed in a covered dish. After two days, fungus growth appeared at the puncture hole in many of the seeds as well as at the micropyle of others and continued to grow for about ten days. The seeds were kept in the dish at room temperature until the end of October, 1950, when some of them were cultured on potato dextrose agar following surface disinfection. After seven days at 25° C. the fungus was again produced from within the seeds. Similarly inoculated seeds of the SP, Paula C, Pima 32, 1517 RB, and other varieties were stored in stoppered glass flasks at room temperature. Of approximately 200 seeds cultured on agar half of them, representing all inoculated varieties, produced the fungus. Most of the seeds germinated at least in part, and about 75 per cent. reached the cotyledon stage.

In several instances the fungus was cultured from inoculated seeds eight months after inoculation. It appears probable that *V. albo-atrum* could be carried in the interior of cotton seeds if it reaches them by natural infection.

Mains (E. B.). **Notes concerning entomogenous fungi.**—*Bull. Torrey bot. Cl.*, 78, 2, pp. 122–133, 12 figs., 1951.

A description is given of *Cordyceps entomorrhiza* [*R.A.M.*, 16, p. 532] and an associated conidial stage differing from those previously suggested for this fungus, both found in 1948 on a coleopterous larva in Mt. Rainier National Park, Washington, and believed to be the first true record of this fungus in North America. The phialides and conidia are similar to those occurring in the genus *Hymenostilbe*. A study of a collection of *Tilachlidiopsis nigra* [ibid., 18, p. 737] from the mycological collections of the United States Bureau of Plant Industry demonstrated the validity of this genus. A description is given of *T. scarabaei* n.sp. isolated from a beetle imago in Illinois. *C. sobolifera* [ibid., 9, p. 524] is described from *Diceroprocta olympusa* in Florida, believed to be the first record of this species in the United States.

Michelbacher (A. E.), Middlekauff (W. W.), & Hanson (C.). **Occurrence of a fungus disease in overwintering stages of the Codling Moth.**—*J. econ. Ent.*, 43, 6, pp. 955–956, 1 fig., 1950.

On 21st March, 1945, 27 per cent. of the overwintering codling moth (*Carpocapsa* [*Cydia*] *pomonella*) larvae [*R.A.M.*, 30, p. 105] under the bark of Persian walnut trees at Linden, California, were killed by a fungus which was identified by Dr. E. A. Steinhaus as closely akin to *Beauveria bassiana* [cf. ibid., 22, p. 230 *et passim*]. In further observations in 1950, 34·82 per cent. of the larvae were dead on 15th March and 70 per cent. on 10th April. The pupae are also attacked to a lesser extent. The incidence of the disease reached a maximum where high humidity promoted the growth of moss over the tree trunks, i.e., on the north rather than on the south side.

A fungus probably identical with the foregoing was reported in 1947 from apple orchards in New Jersey, where it was shown by inoculation experiments to be definitely pathogenic to codling moth larvae (*J. econ. Ent.*, 40, pp. 9–25).

Dimock (A. W.). **The dispersal of viable fungus spores by insecticides.**—*Phytopathology*, 41, 2, pp. 152–156, 1951.

Occasional spots due to *Septoria obesa* [*R.A.M.*, 28, p. 595] have been observed to develop on the leaves of field-grown chrysanthemum plants above the zone normally affected by splashing rain drops and it was suspected that spores of the fungus were carried in the spray blast of non-fungicidal insecticides. In tests at Cornell University, Ithaca, New York, Yellow Fellow chrysanthemum leaves were successfully inoculated with *S. obesa* and *Antirrhinum majus* foliage with *Puccinia antirrhini* [ibid., 27, p. 239; 29, p. 606, and next abstract] by spraying the plants with spore suspensions in a number of insecticidal preparations used at standard concentrations. Many of these were non-fungicidal; others, including righto and hilox (rotenones) in the chrysanthemum tests and benzene hexachloride [ibid., 28, p. 30] and DDT in those on *A. majus*, showed varying degrees of fungicidal efficiency.

Dimock (A. W.). **The dispersal of viable spores of phytopathogenic fungi by fungicidal sprays.**—*Phytopathology*, 41, 2, pp. 157–163, 1951.

Experimental evidence is adduced to show that copper-8-quinolinolate sprays [*R.A.M.*, 29, p. 606; 30, p. 134] may not only fail to control snapdragon [*Antirrhinum majus*] rust (*Puccinia antirrhini*) [see preceding abstract], but actually

intensify infection by the conveyance of viable spores in the spray stream from sporulating uredosori on the lower leaves to the upper ones. Plants of the Afterglow variety were successfully inoculated with uredospore suspensions in copper-8-quinolinolate (1 lb. in 100 gals.), though the resultant infection averaged only 18 to 23 per cent. of that obtained with spores suspended in clear water. Very small amounts of rust also developed following inoculation with spores suspended in 4–4–100 Bordeaux mixture [see next abstract], wettable sulphur, and two experimental sprays, whereas those suspended in fermate, phygon XL, and parzate (all 1–100) did not cause infection. In another test infection resulting from inoculation with uredospores in wettable sulphur was abundant at 50° F. but negligible at 70° to 75° [ibid., 29, p. 419].

It is surmised that exacerbation of infection may arise from the use of (a) a fungicide of low inherent toxicity to the spores of the pathogen concerned; (b) a normally effective fungicide at an unduly low concentration; or (c) a normally effective fungicide under conditions adverse to its action.

Wahl (I.). **Snapdragon rust (Puccinia antirrhini Diet. et Holway) in Palestine.**—*Palest. J. Bot.*, J. Ser., 4, 4, pp. 225–228, 5 figs., 1949. [Hebrew summary.]

Cultivated *Antirrhinum majus* plants in Palestine suffer serious damage from rust (*Puccinia antirrhini*) [*R.A.M.*, 18, p. 204]. The disease appears towards the end of August or early in September, and about the middle of March teleutospores appear. Spread and development are halted in summer. The wild *A. siculum* appears to be immune. In experiments carried out in 1940 copper sulphate at 1 in 10,000 inhibited uredospore germination, while Bordeaux mixture [see preceding abstracts], sulphuric acid, and phenol were much less effective.

Kushnir (T.). **Leaf spot diseases of Iris in Palestine.**—*Palest. J. Bot.*, J. Ser., 4, 4, pp. 230–233, 1949. [Hebrew summary.]

Many wild and cultivated *Iris* species in Palestine are affected by leaf spot diseases, caused either by *Septoria iridis* [*R.A.M.*, 24, p. 476] or *Heterosporium gracile* [*Didymellina macrospora*: ibid., 15, p. 683; 29, p. 215]. Inoculation experiments confirmed that most of the irises are susceptible to a greater or less degree to one or both species, except two species of the section *Pogoniris*, namely, *I. mesopotamica* and *I. albicans*, which remained uninfected. *I. hauranensis* appeared immune from *D. macrospora* and was doubtfully attacked by *S. iridis*.

Noordam (D.). **Enkele ziekten in Amerikaanse Anjers.** [Some diseases of American Carnations.] —*Meded. Direct. Tuinb., Wageningen*, 13, 8, pp. 703–716, 8 figs., 1950. [English summary.]

The author's studies on the etiology, symptomatology, relation to environmental factors, and control of three diseases of glasshouse carnations in Holland are described. The causal pathogens concerned are *Phialophora* [*Verticillium*] *cinerescens*, a note on which has already appeared [*R.A.M.*, 28, p. 400], *Fusarium oxysporum* [cf. ibid., 25, p. 344; 29, p. 606], and *Uromyces caryophyllinus* [*U. dianthi*].

F. oxysporum is of relatively infrequent occurrence, probably on account of the prevailing low temperatures. In artificially contaminated soils wilting of cuttings developed in 3 to 14 weeks, the most susceptible varieties (as also observed in practice) being Betty Lou, White Betty Lou, and Elisabeth. Chief Kokomo and Mia Breuner II were moderately susceptible, while little or no infection was contracted by Barbara Brigham, Dark Pink Fisher, Maine Sunshine, Miller's Yellow, Orchid Beauty, Pharaoh, Topsy, and William Sim.

Of the various fungicides applied in liquid and dry form for the control of *U. dianthi* [cf. ibid., 27, p. 288], which is very common on Betty Lou, Elisabeth, and other varieties, especially on cuttings and rooted young plants in pots, six

treatments with 15 per cent. fermate dust gave the best results. There was no rust on leaves higher than the eighth pair from the top and the flowers were not damaged by the dust.

Butterfield (H. M.). **Rose culture in California.**—*Circ. Calif. agric. Ext. Serv.* 148, 43 pp., 28 figs., 1 map, 1950.

In the section of this circular (pp. 19–24) dealing with rose diseases [cf. *R.A.M.*, 27, p. 324; 30, p. 41] it is stated that powdery mildew (*Sphaerotheca pannosa*) [ibid., 28, p. 635; 29, p. 191; 30, p. 321] is found in almost every part of California. Downy mildew (*Peronospora sparsa*) [ibid., 8, p. 242] occurs only under very humid conditions, as in some glasshouses. Lime-sulphur (1 pt. to 1 gal.) makes a good winter spray against both diseases. Many of the newer varieties are highly resistant to or even almost immune from [powdery] mildew. Resistant popular varieties are Captain Thomas, Charlotte Armstrong, Debonair, Duchess of Atholl, Etoile de Hollande, Fantasia, Golden Rapture, High Noon, Katherine T. Marshall, Mme Henri Guillot, and Bille de Paris; the bush form of Cecile Brunner is resistant and such climbers as Mermaid are comparatively free from the disease. Against rust (*Phragmidium mucronatum*) [ibid., 26, p. 107] complete defoliation at the time of winter-pruning is necessary to prevent carry-over. Bud blast or blight is particularly common on plants not given proper attention; *Botrytis cinerea* [cf. ibid., 18, p. 783; 19, p. 540] may attack the flower tissues, and the unopened flower then drops off. Black spot (*Diplocarpon rosae*) [cf. ibid., 28, p. 66] is found occasionally, but is seldom serious in the moist coastal area. Anthracnose (*Sphaceloma rosarum*) [ibid., 17, p. 683] is controllable by copper or sulphur sprays. Plant canker is caused by *Coniothyrium wernsdorffiae* [cf. ibid., 17, p. 682], stem canker by *C. fuckelii* [ibid., 25, p. 344], and brown canker by *Diaporthe umbrina* [loc. cit.]. Lime-induced chlorosis [cf. ibid., 23, p. 180; 24, p. 112; 26, p. 495] may be treated by applying iron sulphate to the soil (1 to 4 oz. per sq. ft.). It is hoped that elgetol [see above and below, pp. 362, 373] will prove effective against young galls caused by *Agrobacterium* [*Bacterium*] *tumefaciens* [cf. ibid., 22, p. 55]. Any rose plant affected by mosaic virus [ibid., 23, p. 439; 27, p. 324 should be destroyed.

Camici (Leontina). **Rhizoctonia solani Kühn e correlazioni tra fattori parassitari e non parassitari nel 'deperimento dei Garofani' della Riviera Ligure.** [*Rhizoctonia solani* Kühn and correlations between parasitic and non-parasitic factors in 'Carnation wilt' on the Ligurian Riviera.]—*Boll. Staz. Pat. veg. Roma*, Ser. 3, 6, pp. 89–105, 7 figs., 1948 (issued 1950). [English summary. Received February, 1951.]

This is a reprint of a paper already noticed from another source [*R.A.M.*, 28, p. 396].

Baker (K. F.) & Davis (Lily H.). **An unusual occurrence of sclerotia of Sclerotinia spp. with seed of Centaurea cyanus.**—*Plant Dis. Reptr*, 35, 1, pp. 39–41, 1 fig., 1951. [Multilithed.]

A seed sample of *Centaurea cyanus* from a 1945 California commerical crop examined in 1946 at the University of California, Los Angeles, contained sclerotia of *Sclerotinia sclerotiorum* [*R.A.M.*, 29, p. 45] and *S. minor* [ibid., 26, p. 474]. About 20 per cent. of the sclerotia grew on agar after being kept dry for nearly $4\frac{1}{2}$ years under laboratory conditions. Apothecia of the two fungi developed when sclerotia were sown with the seed in the greenhouse and the discharged ascospores infected the stems of young plants. Having the same size and shape as the seed, the sclerotia were not removed by the screens and cleaning machinery. Such sclerotia are commonly produced in the pith of slender *C. cyanus* stems. The development of

the fungi is favoured by the moist conditions of the coastal districts where most of the seed is grown [cf. ibid., 30, p. 207].

Stoner (W. N.). **An aphid-transmitted virus disease of Fuller's Teasel and Pincushion Flower.**—*Phytopathology*, 41, 2, pp. 191–194, 1 fig., 1951.

In May, 1948, G. E. Altstatt observed mosaic-like symptoms in a commercial planting of fuller's teasel (*Dipsacus fullonum*) near Sunnyvale, California, and M. W. Gardner collected specimens heavily infested by the rose aphid (*Macrosiphum rosae*). In greenhouse tests at Berkeley lots of ten of these aphids were transferred to ten healthy seedling teasels, one of which contracted infection. Mechanical inoculations gave negative results.

The first symptom of the disease appears in the younger, almost fully grown leaves, developing four to eight days after infestation as a unilateral basal vein-clearing in the lamina, which extended two to four days later with concurrent asymmetry. These symptoms were less conspicuous in the next few whorls of leaves to develop, but a strong mosaic pattern appeared, accompanied by progressive foliar malformation. In subsequent whorls there was less mottling and more distortion, and in the final stages the lamina was reduced to a mere thread.

In further inoculation experiments on 25 teasel seedlings with lots of five aphids each of *M. rosae*, *Myzus persicae*, *Rhopalosiphum prunifoliae*, and *Macrosiphum granarium*, transmission occurred only with the *M. rosae* and *Myzus persicae* series (8 and 11, respectively). The virus was conveyed by five aphids of each of these species to healthy teasel seedlings after a 24-hour feeding period, but neither vector retained it long enough for transmission in subsequent transfers.

No reference was found to teasel as a virus host, but K. M. Smith lists *Scabiosa* as susceptible to *Cucumis* virus 1 [cucumber mosaic virus: *R.A.M.*, 17, p. 52]. This virus was transmitted by both juice and aphid (*M. persicae*) inoculations to *S. atropurpurea* (pincushion flower) but not to teasel. The former species was the only one out of six tested to react positively to inoculation with the teasel virus. The symptoms developed in the same sequence in *S. atropurpurea* as in teasel, but except for persistent vein-clearing they were less noticeable. The teasel mosaic disease is believed to be caused by a hitherto undescribed virus, for which the name of *Marmor dipsacum* is proposed.

Ark (P. A.) & Snyder (W. C.). **Black spot of Vanda Orchids.**—*Plant Dis. Reptr*, 35, 1, pp. 43–44, 1951. [Multilithed.]

Vanda tricolor blooms received recently in San Francisco and Chicago from Hawaii had discoloured petals and black spots of varying sizes in the flower throat, rendering them unmarketable. After five days in a moist chamber affected flowers may become entirely black, with a dark grey fungus growth appearing on the discoloured parts. Isolations yielded a *Glomerella* [*R.A.M.*, 29, p. 155], which in pure culture on natural substrata produced a *Colletotrichum* stage. Spray inoculations of healthy flowers resulted in the same type of spoilage. Control has been effected by spraying the blossoms before the appearance of symptoms with a solution of bioquin 700 (*o*–quinolinol benzoate).

Smith (F. F.) & Brierly (P.). **Aster yellows in Canna.**—*Phytopathology*, 41, 2, pp. 190–191, 1951.

In an examination of *Canna* varieties in a Delaware nursery in 1947, President was found to be free from mosaic [*R.A.M.*, 27, p. 464; 30, p. 39], but a few plants of this variety and others showed symptoms of a much more severe infection suspected to be due to the aster yellows virus. They comprised stunting, chlorosis, and (in one case) floral virescence. Symptoms of aster yellows were observed on

Erigeron sp. near the edge of the *Canna* field. The virus was transmitted from infected lettuce to President by *Macrosteles divisus* in two trials and subtransferred to China aster from one of the affected *Canna* plants.

No symptoms of aster yellows appeared in *Canna* plants inoculated in August, 1948, until growth was resumed in May, 1949, when one of the plants remained severely dwarfed and the young leaves showed an irregular, diffuse, dull yellowing, later turning bronze. The virus was recovered twice in aster from this plant by leafhopper transfer. The infected *Canna* was dead 14 months after exposure to aster yellows.

Small, actively growing plants inoculated in June, 1949, developed yellows symptoms on current-season growth in two to four months. Yellowing was first observed in the youngest leaves, which later became flaccid and withered, the shoots eventually dying back to soil-level. Lateral shoots formed in December were weak, chlorotic, and dwarfed, and the poor second season growth was dying 10 months after inoculation. These symptoms resembled those observed in the field, which were probably the second-season effects of late attacks in the previous growing season.

The low incidence of infection in *Canna* indicates that the disease is not a serious threat to the crop. The latter is, however, readily colonized by *M. divisus* and some outbreaks are to be expected in areas of high aster yellows prevalence.

Ark (P. A.) & Starr (M. P.). **Bacterial diseases of Orchids.**—*Plant Dis. Reptr*, 35, 1, pp. 42–43, 1951. [Multilithed.]

The most common orchid diseases in central California are brown spot of *Phalaenopsis* and *Cattleya* caused by *Phytomonas* [*Bacterium*] *cattleyae* [*R.A.M.*, 26, p. 59], brown rot of *Cypripedium* caused a bacterium similar to *Erwinia cypripedii* [cf. ibid., 22, p. 207], and leaf scorch and pseudo-bulb rot of *Miltonia* due to an unidentified bacterium.

Bact. cattleyae is destructive on both *Phalaenopsis* seedlings (infection starting through the stomata) and mature plants (through wounds). The exudation of the infectious material on the surface of the diseased plant serves as a potential source of inoculum. On *Cattleya* the disease is limited to the older leaves. The disease can be prevented to a great extent by avoiding overhead irrigation and by good aeration. The seedling phase in *Phalaenopsis* can be controlled by drenching with 1:2,000 concentrations of 8-quinolinol benzoate (or sulphate) or sodium *o*-hydroxydiphenyl (natriphene) [see next abstract]. Pots containing a community of seedlings can be submerged for an hour or longer. If necessary the treatment can be repeated after about two weeks. Mature plants should be submerged in the solutions for several hours. Complete control was achieved on severely infected 30-year-old plants.

Brown rot of *Cypripedium* was very severe in several glasshouses. Circular or oval, water-soaked, light brown spots appear on the leaves, which later become somewhat sunken and deep chestnut brown, with a well-defined margin. The infection progresses rapidly into the growing point at temperatures above 65° F. and at 70 per cent. or more humidity. Affected crowns shrivel and the leaves droop. Inoculated healthy plants became infected. The same control is recommended as for brown spot.

The disease of *Miltonia* is characterized by tip blight or scorch, which may be arrested and then reappear as a water-soaked streak at the leaf base, leading into the growing point on the pseudo-bulb. The tissue of the latter is at first straw yellow, later turning orange red or bright red. The bacterium progresses through the rhizome and can attack new pseudo-bulbs from below the crown. Infected leaves frequently drop. Infection starts through wounds. Treatment with the two materials described gave the best control.

Ark (P. A.) & Maclean (N. A.). **Botrytis spot and blight of Tuberoses in California.** —*Plant Dis. Reptr*, 35, 1, pp. 45–46, 1 fig., 1951. [Multilithed.]

Commercial plantings of tuberoses (*Polianthes tuberosa*) in coastal districts of California are frequently attacked by *Botrytis elliptica* [*R.A.M.*, 28, p. 175; 29, p. 307], causing considerable losses in flower production. Leaves and flowers are spotted, streaked, and blighted. Spread of the disease is facilitated by sprinkler irrigation. The high humidity and cool summers of the coastal area favour the development of the fungus. Inoculated plants developed typical infections and the fungus was re-isolated.

Bulbs with neck lesions produced 100 per cent. infected plants, while a few leaf lesions only occurred on healthy plants planted 12 feet away. Bulbs from a diseased field dipped before planting in ½ per cent. lysol solution for one hour or in 1:2,000 natriphene solution [see preceding abstract] for three hours developed 7 and 3 per cent. infection, respectively, untreated having 85 per cent. Spraying field plants showing light leaf infections with ammoniacal copper (2 gals. per 100 gals. water), greenol or 1:2000 natriphene kept the disease under control for two weeks, after which the treatment had to be repeated.

Fabricatore (Jolanda A.). **Colletotrichum mahoniae n. sp. parassita su foglie di Mahonia aquifolium.** [*Colletotrichum mahoniae* n.sp., a parasite on leaves of *Mahonia aquifolium*.]—*Boll. Staz. Pat. veg., Roma*, Ser. 3, 6, pp. 133–139, 4 figs., 1948 (issued 1950). [English summary. Received February, 1951.]

A *Mahonia aquifolium* bush in the garden of the Station of Plant Pathology, Rome, developed numerous grey, sub-circular spots 1 to 1·5 mm. in diameter on the leaf blades. Occasionally they became confluent and developed an irregular outline. The centres fell out. A fungus with amphigenous, subepidermal, later erumpent, brown acervuli was isolated. Setae were sometimes present abundantly; they were brown, continuous, 14·5 to 42·4 (average 30) μ long, with a bulbous base and a tapering tip. The subcylindrical, hyaline conidia measured 12 to 12·5 by 4·5 to 5 μ. The fungus is named *Colletotrichum mahoniae* n.sp.

Inoculations of wounded and unwounded leaves of a potted *M. aquifolium* plant with conidial and mycelial suspensions of the fungus gave positive results.

Gaudineau (M[arguerite]) & Ventura (E.). **Traitements d'hiver des arbres fruitiers. Première partie. Traitements des arbres fruitiers à réaliser en hiver contre les cryptogames. Deuxième partie. Le rôle des traitements d'hiver dans la lutte contre les insectes et autres ravageurs nuisibles aux arbres fruitiers.** [Winter treatments for fruit trees. Part one. Treatments of fruit trees to be made in winter against cryptogams. Part two. The role of winter treatments in the control of insects and other harmful pests of fruit trees.]—*Bull. tech. Inform. Ingén. Serv. agric.* 49, pp. 1–11, 7 figs., 1950.

In this résumé of winter treatments for fruit trees it is recommended that stocks and scions from nurseries infected with *Bacterium tumefaciens* [C.M.I. map. No. 137] should be treated with 1:1,000 mercuric chloride followed by washing with water, or steeped for an hour in copper sulphate solution at 4 gm. per l. Good results followed the steeping of peach roots in 0·5 per cent. organo-mercurial products. Older trees may sometimes be cured by disinfecting the galls with materials such as dinitro-*o*-cresol (DNC: 1 part to 4 parts methyl alcohol). Recommendations for winter treatments include the application of anthracene oil to pear branches and fallen leaves from December to January to destroy the perithecia of the scab fungus [*Venturia pirina*: *R.A.M.*, 29, p. 570], and DNC, with or without anthracene oil, or formalin to destroy the conidia. From February to March before bud-burst conidial development may also be controlled by spraying the

branches with 8 per cent. anthracene oil, 4 per cent. Bordeaux mixture, 4 to 8 per cent. lime-sulphur, or formalin. The perithecia of the apple scab fungus [*V. inaequalis*: ibid., 29, p. 157] may be destroyed by spraying the fallen leaves with DNC [ibid., 27, p. 427; 29, p. 101] from December to January. Quince and cherry trees should be sprayed with 2 per cent. Bordeaux from February to March against *Monilia* [*Sclerotinia fructigena* and *S. laxa*: ibid., 25, p. 304] and *Stigmatea* on the former and *Coryneum* [? *beijerinckii*: *Clasterosporium carpophilum*] on the latter [ibid., 26, p. 186; 30, p. 172].

The copper mixtures are the fungicides most commonly used as winter sprays for fruit trees, Bordeaux mixture at 2 per cent. for stone fruits and 4 to 6 per cent. for pome fruits. Copper oxychloride mixtures and copper oxide products have the advantage of being prepared more quickly than Bordeaux or Burgundy mixtures. Chloro β-naphthol, a synthetic product with fungicidal properties, is used against *Taphrina deformans* on peach either as a 0·5 per cent. solution of the sodium or potassium salt, or dissolved in a mineral oil.

Sleeth (B.). **Diplodia crown rot of Alfalfa.** -*Plant Dis. Reptr*, 35, 1, pp. 50–51, 1 fig., 1951. [Multilithed.]

Lucerne crown rot is a common and destructive disease in the Yuma Mesa area, Arizona, especially during the period August–October. Three- to four-year-old stands suffer most, but heavy losses were also observed in small localized areas in stands nine to 12 months old. The affected plants yielded most frequently species of *Fusarium* [*R.A.M.*, 28, p. 628], and less commonly *Diplodia natalensis* [ibid., 5, p. 90]. In the early autumn of 1948 *D. natalensis* was found on several dead and dying lucerne plants affected with crown rot, in three- and four-year-old plantings. Incidence in these fields has increased considerably since. The disease is characterized by a black, mostly dry rot which develops in the crown and rapidly advances into the taproot. Later typical black, erumpent pycnidia develop.

Inoculated healthy lucerne plants developed typical crown rot symptoms and the fungus was re-isolated eight days later 1 to 3 in. beyond the point of inoculation. *D. natalensis* is at present a minor agent of lucerne crown rot, but its significance may increase. Mechanical injury to crowns at the time when viable inoculum is abundant and its subsequent build-up are important factors. The proximity of citrus groves in the Yuma area is possibly connected with the incidence.

Andrén (F.). **Besprutningsförsök mot Äppleskorv.** [Spraying experiments against Apple scab.] -*Växtskyddsnotiser, Växtskyddsanst., Stockh.*, *1950*, 5–6, pp. 92–94, 1 fig., 1950.

In experiments on the control of apple scab [*Venturia inaequalis*] on the Signe Tillisch variety in Sweden [*R.A.M.*, 27, p. 428] in 1949, when the disease was very severe, especially during the wet, late summer, the best results were given by the usual Bordeaux mixture schedule. The percentages of freedom from scab and slight and heavy infection on the trees treated in this way were 88, 12, and 0, respectively; the corresponding figures for 0·1 per cent. carsane [ibid., 28, p. 235] being 44·1, 51·7, and 4·2; for 0·5 per cent. sulfaki (colloidal sulphur) 43·5, 53·8, and 2·7; and for the controls 2·6, 50·7, and 46·7, respectively.

In 1950 scab was of relatively little importance. In tests on the Oranie variety Bordeaux conferred absolute protection but caused severe spray injury. Of the other fungicides used, 1 per cent. nirit and 1 to ½ per cent. midol-tio-mercuri proved somewhat superior to the rest, with 98·8 and 96·5 per cent. freedom from scab, respectively, compared with 82 for the unsprayed. The latter preparation, however, contains mercury and its use on fruit trees would therefore be prohibited under Swedish law.

Struble (F. B.) & Keitt (G. W.). **Variability and inheritance in Glomerella cingulata (Stonem.) S. and V.S. from Apple.**—*Amer. J. Bot.*, 37, 8, pp. 563–576, 7 figs., 1950.

In studies at the University of Wisconsin seven types of *Glomerella cingulata* from apple [*R.A.M.*, 30, p. 276] were differentiated and defined: plus and minus A and B, degenerate minus, conidial, and chromogenic. Fertile perithecia developed most rapidly at temperatures ranging from 20° to 28° C.; conidia were produced usually at any temperature favouring growth. None of 703 monoconidial isolates was of the minus type, and there was evidence that culturing on apple fruits greatly reduced the percentage of perithecia yielding any minus lines. This type was not isolated from conidia or mycelium of a plus type culture, except when the conidia had been subjected to ultra-violet radiation. The plus type dominated in plate cultures started with a conidial mixture of both types, and fruits inoculated with such a mixture yielded only plus. Paired plus and minus cultures of the same apple strain regularly formed perithecia along the line of contact. Conidia of a plus A culture subjected to ultra-violet radiation gave rise to various mutants, including minus A, minus B, and degenerate minus.

Nyland (G.) & Schlocker (A.). **Yellow leaf roll of Peach.**—*Plant Dis. Reptr*, 35, 1, p. 33, 1951. [Multilithed.]

A new disease of clingstone peaches, tentatively called yellow leaf roll, has been reported from California, where it occurred in about 20 orchards in the Yuba county and in 10 orchards in the adjoining Sutter county. The disease, which is probably of a virus nature, has spread rapidly during the last three years. Thus in a block of about 900 trees where eight were affected in 1948, there were 25 more in 1949, and 80 in 1950.

Leaf symptoms are characterized by marked yellowing, rolling upward and inward, some marginal scorching and necrotic spotting resulting in ragged leaves, curving of the leaves towards the stem, and, later in the season, distinct vein swelling. Fruit development and production are arrested and fail. The entire tree or only a part may be affected. The disease apparently advances upward from the base of the main scaffold limbs. Often the terminal part of a nearly completely diseased limb may look healthy. Of the 12 common varieties of clingstone peaches grown in the area, at least seven were affected in the field.

In July, 1950, buds and older spurs from diseased trees were budded on one-year-old Gaume, Elberta, and Rio Oso Gem. One Gaume and one Elberta showed typical symptoms in October.

Gigante (R.). **Il mosaico del Pesco.** [Peach mosaic.] –*Boll. Staz. Pat. veg. Roma*, Ser. 3, 6, pp. 19–30, 5 figs., 1948 (issued 1950). [English summary. Received February, 1951.]

A mosaic of peach trees [cf. *R.A.M.*, 29, pp. 500, 513] was found in Italy, apparently for the first time, in 1940 at Ravenna on three Précoce argentée trees. Yellowish, chlorotic spots up to 2 mm. in diameter appeared on the upper surface of both young and mature leaves and often became confluent; yellowish, longitudinal, wavy stripes and markings resembling 'asteroid spot' [ibid., 17, p. 609] were sometimes present. The affected parts were thinner than the normal parts of the leaf. In many cases the branches of the affected trees were shorter and the nodes closer together. The fruits were outwardly normal; the flesh showed no appreciable injury, but was watery and insipid. Seeds from diseased trees gave healthy plants [cf. ibid., 16, p. 544].

Affected trees should be destroyed as soon as the earliest symptoms appear.

In any area where the disease becomes serious and widespread the most susceptible varieties should be replaced by resistant ones.

FONDARD (L.). **La chlorose calcique du Pêcher [et les sels minéraux].** [Calcium chlorosis of Peach and mineral salts.]—[*Rév. Agric.*, 58, pp. 305–306, 1949.] Abs. in *Fruits & Primeurs*, 20, 220, p. 409, 1950.

Triumph peach trees in Puy de Dôme severely affected by lime-induced chlorosis [*R.A.M.*, 18, p. 35; cf. 23, p. 348] were treated by (*a*) painting the pruning wounds in February with a 0·26 per cent. solution of iron potassium sesquitartrate (Rassiguier's method) [ibid., 15, p. 516], (*b*) Gris's method [loc. cit.] of spraying in May with iron ammonium sulphate 0·5 per cent., 2·5 to 3 l. per tree, (*c*) Mokrzecki's method [loc. cit.] of injecting in June through three holes in the trunk and main branches 20 gm. iron and potassium sesquitartrate per tree, and (*d*) all three methods together, used concurrently and successively on the same tree. The best results were given by (*d*), vigour returned to normal, improvement being maintained at the end of the following summer, and yield in the same year was normal and a year later was equivalent in number of fruits, but less in weight.

WELSH (M. F.) & WILKS (J. M.). **Induced modification of symptom severity in little Cherry.**—*Phytopathology*, 41, 2, pp. 136–138, 1 fig., 1951.

In the Kootenay region of British Columbia the severity of little cherry [*R.A.M.*, 29, p. 349; 30, p. 170] symptoms varies strikingly from district to district, from tree to tree, from one season to another in the same tree, and frequently among the fruits of a given tree in a single year. In 1947 the writers' attention was drawn to a diseased Lambert tree, of which only one limb, growing beneath a verandah roof on the north side of a farmhouse, bore apparently normal fruits. In 1948 an adjacent limb, trained under the roof early in the spring, produced during the same season fruits larger than those on other parts of the tree.

From June, 1948, to the end of 1949 the greater portion of a single large limb of a Lambert tree at Kootenay Bay, with a history of exceptionally consistent symptom severity, was enclosed within a wooden shelter which reduced to about 3 per cent. the incident light reaching the extremities of the branch on cloudy to bright midsummer days. The 1948 crop was as usual, but in 1949 the average diameters (in mm.) weights (in gm.), and soluble solids of nine fruits on the unsheltered and 30 on the sheltered portions of the sheltered limb were 24·6, 7, and 10·1 and 28·2, 9·5, and 11·3, respectively, the corresponding values for 544 on unsheltered limbs being 20·1, 5·1, and 8·7, respectively.

Positive results (light to dark red solutions) with Lindner's test for stone fruit viruses [ibid., 29, p. 312] were uniformly obtained with the unsheltered leaves, whereas the sheltered gave consistently negative reactions.

Evidence is adduced from three seasons' observations in diseased orchards of a relation between luxuriance of foliage and severity of fruit symptoms. Further experiments are planned to resolve more specifically the responsible factors and the critical adjustments necessary for varying degrees of symptom masking.

PRENTICE (I. W.). **Rubus stunt : a virus disease.**—*J. hort. Sci.*, 26, 1, pp. 35–42, 5 pl., 1950.

Stunting of Phenomenal berry (*Rubus loganobaccus*), Himalaya berry (*R. procerus*) and parsley-leaved blackberry (*R. laciniatus*) has been common in south-east England since it was first recorded in 1931 [*Rep. E. Malling Res. Sta., 1931*, p. 49]. More recently, similar symptoms have been observed on loganberry, wild blackberry, raspberry, and many *Rubus* hybrids.

On loganberry and Phenomenal berry the disease is characterized by numerous, weak, short new canes giving the plant a bushy appearance which becomes more

pronounced in successive years. The flowers on the fruiting laterals may be malformed and are fewer than on healthy ones; the weak canes generally fail to flower. Early in summer the leaves of infected plants are pale yellowish-green. In the other hosts deterioration is slower. In raspberry symptoms depend to some extent on the variety infected [cf. *R.A.M.*, 28, p. 340].

The disease was transmitted by grafting from loganberry to loganberry, parsley-leaved blackberry and raspberry, and from wild blackberry and raspberry to loganberry, the symptoms appearing on the scions usually in the following year. The disease is, therefore, considered to be of virus nature.

Winter tar oil spraying is advised as a precautionary measure against possible vectors. Infected plants should be rogued as soon as they are detected. Stunt is apparently distinct from any virus disease of *Rubus* so far described, but may be related to the dwarfing disease reported from California [ibid., 29, p. 516].

Nicolini (J. C.) & Traversi (Blanca A.). **Observaciones sobre una nueva enfermedad del Olivo en la Argentina.** [Observations on a new Olive disease in Argentina.]—Reprinted from *Inf. Direcc. Invest. agríc., B. Aires*, 3, 32, 6 pp., 5 figs., 1950.

The rapid diffusion through the olive groves of Argentina of a disease commonly known as 'partial paralysis' is causing serious concern to growers. The first symptoms, observed on isolated young plants, consist of chlorotic, curled leaves on secondary twigs, to which they remain adhering on desiccation. Later the entire branch shrivels from the tip backwards, while a dark reddish-purple band appears on the bark. The remaining branches and foliage become similarly involved and the plant ultimately dies. The leaf tips often show a yellow bronzing which extends along the surface for a certain distance and then stops abruptly, leaving the rest of the leaf apparently normal; the necrotic area remains firmly attached. Many leaves, especially those of the new buds, show a mosaic pattern, with darkening of the midrib. The aspect of the disease varies greatly from one year to the next, the symptoms being closely related to the growing conditions of the plants and the climatic factors prevailing during the season. When these are favourable and cultural practices are sound, a tree that was severely diseased a few months earlier will appear quite recovered, and budding may be prolific on previously shrivelled branches. Sections of twigs from diseased plants exhale a strong odour of fermenting must or rancid oil. Many rootlets were decayed. Internally there is a progressive disorganization of the phloem and cambium. From the phloem the breakdown extends outwards to the cortex, involving the pericycle fibres, and inwards to the cambium. The very thin walls of the latter swell and the cells multiply rapidly, with a resultant increase in the width of the cambial zone. Disorganization of the cambium ensues, extending in severe cases as far as the secondary xylem, which assumes a chestnut to nearly black tint. The palisade tissue of leaves contains heavy deposits of starch in abnormally large granules. The spongy tissue is also full of starch, while the number of chloroplasts is reduced. Malformations are confined to the young cells.

The various strains of bacteria and fungi isolated from samples of diseased material were non-pathogenic in inoculation experiments. In the greenhouse the infective principle, presumably a virus, was transmitted by grafting buds or scions from trees with partial paralysis on to privet (*Ligustrum sinense*) plants, which after six months developed symptoms corresponding to those described above. First, the leaves showed a mosaic pattern and then single or double concentric, chlorotic rings which soon became necrotic. In the leaf axils arose a rosette of mottled leaflets which remained at half the normal size.

The new olive disease resembles the progressive decline reported from Italy [*R.A.M.*, 28, p. 227] and the boron deficiency occurring in California [ibid., 23, p.

69]. It further presents certain analogies with the 'rootlet rot' or 'tristeza' of citrus [ibid., 27, p. 130; 28, p. 61, *et passim*].

Ruggieri (G.). **Ricerche ed esperienze su una tracheoverticilliosi dell' Olivo.** [Researches and experiments on a tracheoverticilliosis of Olive.]—*Boll. Staz. Pat. veg. Roma*, Ser. 3, 6, pp. 71–78, 1948 (issued 1950). [English summary. Received February, 1951.]

This is a reprint of a paper on *Verticillium albo-atrum* on olive already noticed from another source [*R.A.M.*, 28, p. 226].

Reinking (O. A.). **Banana mosaic in Borneo and its relationship to Abacá mosaic in the Philippines.**—*Plant Dis. Reptr*, 35, 1, pp. 31–32, 1951. [Multilithed.]

In October, 1950, the author found typical banana mosaic [? a strain of cucumber mosaic virus] on Lady Finger and Cavendish varieties in a small planting at Tawau, British North Borneo, which closely resembled that reported from Brazil [*R.A.M.*, 13, p. 250] and other countries, but differed from that previously described in North Borneo [ibid., 29, p. 316]. The mosaic resembled somewhat abaca [*Musa textilis*] mosaic of the Philippines [ibid., 30, p. 39]. Although a virus-infected weed, *Paspalum conjugatum*, and an aphid closely resembling *Aphis gossypii* [loc. cit.] are common in most abaca plantations, abaca mosaic has not yet been observed.

Anderson (E. J.). **A simple method for detecting the presence of Phytophthora cinnamomi Rands in soil.**—*Phytopathology*, 41, 2, pp. 187–189, 1951.

The following method has been successfully used for the past ten years at the Pineapple Research Institute of Hawaii, Honolulu, for the detection of *Phytophthora cinnamomi* [*R.A.M.*, 27, p. 142] in the soil [ibid., 28, p. 366; 30, p. 278, and next abstract]. Small samples of soil, taken at a depth range from 1 to 6 in. during the cool, wet season, are protected from drying and not exposed to temperatures above 85° F. One or two tablespoonsful of the soil sample are added to a pint- or quart-size jar filled with tap water and allowed to settle. A pineapple crown rooted in clean water is then fixed so that the roots are in the water but not in contact with the soil, or leaves with 1 in. or more of white base touching the soil are used. The jars are kept in the shade at temperatures ranging from about 70° to 75°. After four days or so, watersoaked lesions begin to develop near the root tip and soon involve the soft portion of the root. Similar spots appear at the leaf bases. As soon as fungal growth becomes visible the affected parts are transferred to a dish of water.

In a modified form the method herein described is applicable to the estimation of the efficiency of chemicals for inhibition of zoospore production and infection. Appropriate dosages of the compounds are added to the water after mixing in infested soil or fragments of agar cultures plus a small quantity of raw soil.

Zentmyer (G. A.) & Popenoe (W.). **Phytophthora cinnamomi on Avocado in Honduras.**—*Plant Dis. Reptr*, 35, 1, p. 25, 1951. [Multilithed.]

Phytophthora cinnamomi [see preceding abstract] was recently isolated from feeder roots of diseased Atlixco avocado hybrids, growing in a nursery at Tegucigalpa, Honduras, on clayey, badly drained soil. Many of the nursery trees, as well as all trees in a planting on similar soil, have died in the past few years. The majority of two- to five-year-old trees succumb. The fungus appears to be native in soils of the area; it is the first record of its appearance in Honduras.

Jain (A. C.). **Cercospora leaf spot on Cephalandra indica Naud.**—*Sci. & Cult.*, 16, pp. 113–115, 3 figs., 1950.

In November, 1948, *Coccinia indica* plants at New Delhi developed pale yellowish

spots 0·5 to 4 (average 2·5) mm. in diameter on the upper surface of the leaves. Later visible on the under surface also, they turned brownish and then whitish and depressed from the centre outwards, presenting a brown ring when mature. The centre was dotted with black clusters of conidiophores. The affected leaves turned yellowish and dried off.

The fungus present was determined as a species of *Cercospora* with strongly stromatic sporodochia formed under the epidermis, stoma, or cuticle. The emergent conidiophores were brown, 0- to 5-septate, simple, 1- to 5-geniculate and measured 12 to 120 (average 71·7) by 3 to 6 (average 4·4) μ. The hyaline to olivaceous, filiform to almost obclavate conidia were 0- to 12-, usually 3- to 5-septate and measured 21·5 to 141 (average 68·1) by 2·3 to 6·4 (average 4·5) μ. In culture on rice meal agar the conidia were 4- to 19- septate, and measured 41·4 to 152·6 (average 104·3) by 3·6 to 7·3 (average 5·9) μ. Leaves of *C. indica* sprayed with a water suspension of the conidia developed typical symptoms in three to four days. Further work is in progress.

Raucourt (M.). **Revue de phytopharmacie. X^e^ Série.** [Review of phytopharmacy. 10th series.]—*Ann. Inst. nat. Rech. agron.*, Sér. C (*Ann. Épiphyt.*), 1, 2, pp. 208–244, 1950.

In this tenth contribution to the present series [*R.A.M.*, 26, p. 21; see also *Ann. agron.*, *1931*, pp. 366 *et seq.*; *1933*, pp. 232 *et seq.*; *1935*, pp. 385 *et seq.*; *1937*, pp. 817 *et seq.*; *1940*, pp. 127 *et seq.*; *1942*, pp. 451–486; *1945*, pp. 379–433; *1947*, pp. 719–764] the author reviews from the literature (176 titles) methods of evaluating the efficacy of fungicides and insecticides and discusses, *inter alia*, recent work on mineral fungicides and the use of growth substances.

Burchfield (H. P.) & McNew (G. L.). **Mechanism of particle size effects of fungicides on plant protection.** *Contr. Boyce Thompson Inst.*, 16, 3, pp. 131–161, 1 fig., 7 graphs, 1950.

In studies made at the Boyce Thompson Institute for Plant Research an examination of the dosage-response curves [*R.A.M.*, 29, p. 161] obtained with a series of phygon samples with narrow particle size ranges indicated that the amount of this fungicide required to control tomato early blight (*Alternaria solani*) is inversely proportional to the logarithm of the number of particles per unit area of leaf surface over the range studied. This relationship can be derived analytically provided that several basic assumptions are made regarding the mechanism of the particle size effect. The performance of a dust relative to a standard can be predicted from its particle size distribution curve and the regression of ED_{95} with particle radius. A curve relating particle radius with total surface of a fungicide at ED_{95} and exhibiting a minimum near 5 μ was obtained. It is believed that photochemically sensitive materials can be used most effectively in this range since a low ED_{95} is obtained in combination with a minimum surface exposure. Reducing the particle size of phygon was not as effective in preventing seed decay of Perfection peas as in controlling tomato early blight. This may be related to the comparatively large doses required in seed treatment with consequent saturation of the surface when large particles are used. The regression of ED_{95} with particle radius proved useful in interpreting interrelationships between dosage, response, specific surface, and number of particles, which are often not obtainable by direct experimentation. Various mechanisms which can be used to explain the particle size effect are discussed in detail. A consideration of these effects together with information on the chemical and physical properties of the toxicant may often prove useful in preparing formulae of new fungicides.

McNew (G. L.) & Burchfield (H. P.). **Particle size in relation to the fungitoxicity of dichloronaphthoquinone.**—*Contr. Boyce Thompson Inst.*, 16, 3, pp. 163–176, 1 fig., 1 graph, 1950.

Dichloronaphthoquinone (phygon) made up with a diluent as a special, small-particled, all-purpose garden dust (phygon XL) with insecticides and sulphur was more effective than pure chemical in preventing late blight (*Phytophthora infestans*) of John Baer tomatoes and Green Mountain potatoes under field conditions in 1946 and early blight of tomatoes (*Alternaria solani*) [see preceding abstract] in the greenhouse. It was equivalent to 4–2–50 Bordeaux mixture. Experiments showed that particle size could be altered by grinding with different types of diluents. The effectiveness of the material in protecting foliage was directly correlated with particle size at the time of deposition, about forty times as much material with a particle size of 20 μ being required as of 1 μ size to give comparable disease control. Particles having a radius of less than 1 μ tended to be less effective in preventing the germination of seven-day-old conidia of *Alternaria oleracea* [*A. brassicicola*] and *Sclerotinia fructicola* on glass slides than those measuring 1 to 3 μ. The fact that the results of laboratory screening tests depend partly upon the size of particles used should be taken into account when preparing samples for testing.

Mason (C. T.), Brown (R. W.), & Minga (Audrey E.). **The relationship between fungicidal activity and chemical constitution.**—*Phytopathology*, 41, 2, pp. 164–171, 1951.

Of 82 compounds tested at the Carver Foundation, Tuskegee Institute, Alabama, for their inhibitory action on *Aspergillus niger* [*R.A.M.*, 30, p. 175], the most effective were some of the quaternary ammonium compounds and alkyl- and chloro-substituted phenols. For instance, the inhibiting concentrations of cetab (hexadecyltrimethyl ammonium chloride), rodalon (90 per cent. alkyldimethylbenzyl ammonium chloride), both supplied by the Rhodes Chemical Corporation, 3-isopropyl-4-chloro-6-methylphenol, and octimet (85 per cent. octadecyl- to 15 per cent. octadecenyldimethylethyl ammonium bromide), both synthesized in the laboratory of the Institute, were 0·0038, 0·0038, 0·0049, and 0·0075 per cent., respectively. Substituent groups listed in order of their ability to enhance inhibitory efficacy are ring alkyl, aryl, secondary- or tertiary-alkyl, halogen, and nitrogen. *Para* substitution was found to be more effective than *ortho* or *meta* [cf. ibid., 29, p. 317].

Rich (S.) & Horsfall (J. G.). **Gaseous toxicants from organic sulfur compounds.**—*Amer. J. Bot.*, 37, 8, pp. 643–650, 1950.

Experiments were carried out in the Department of Plant Pathology, Connecticut Agricultural Experiment Station to determine the nature of the toxic emanations from certain organic sulphur compounds and their effect on the spores of *Stemphylium sarciniforme* and *Sclerotinia fructicola* [*R.A.M.*, 29, p. 471]. A closed system in the shape of a large-scale van Tieghem cell was used and no correlation was observed between detectable hydrogen sulphide and toxic emanations from purified nabam (disodium ethylene bisdithiocarbamate) [ibid., 29, p. 221]. Although *S. fructicola* spores are able to release hydrogen sulphide from nabam they did not thereby impart any additional toxicity to *Stemphylium* spores intermingled in the same spore drop. Nabam was more toxic to *Stemphylium* spores than to *Sclerotinia* spores, although the latter are more sensitive to hydrogen sulphide than the former. A similar response was observed with seven other organic sulphur compounds. Toxic gases from nabam solutions killed *Stemphylium* spores far below the predetermined concentration levels for hydrogen sulphide [ibid., 10, p. 741]. The dosage-response curves for nabam solutions when *Stemphylium* spores were either mixed with them or suspended above them differed widely from those

already obtained for hydrogen sulphide [loc. cit.]. Tests in which sulphur dioxide and ethylene thiourea were compared with nabam showed that these compounds are not involved directly in the fungicidal action of nabam.

It is concluded that purified nabam liberates a gaseous toxicant, which is not hydrogen sulphide, and while this emanation remains unidentified the fungicidal action of nabam cannot be satisfactorily explained.

Ark (P. A.). **Sodium salt of o-hydroxydiphenyl, a promising chemotherapeutant.**—*Plant Dis. Reptr*, 35, 1, p. 44, 1951. [Multilithed.]

In tests at the University of California, Berkeley, the efficacy of the sodium salt of *o*-hydroxydiphenyl (natriphene) [see above, p. 372] was evaluated for the prevention of damping-off of tomatoes, [chilli] peppers, marigolds, and snapdragons [*Antirrhinum*] caused by *Rhizoctonia* [*Corticium*] *solani*. Seeds were sown in pasteurized soil, the same inoculated with the fungus, and pasteurized, inoculated soil saturated with a 1 : 1000 solution of the preparation when germination was observed and three times subsequently. After 30 days the numbers of surviving plants in each series for the four test plants, respectively, were as follows: 90, 85, 100, 98; 20, 0, 5, 0; and 75, 78, 95, and 95. Similar results with this chemical were obtained with annuals by nurserymen. Slight injury resulted to very tender plants when the commercial grade of natriphene was used but not with the medicinal.

Stevenson (J. A.) & Rogers (D. P.). **Mycological nomenclature at the 7th International Botanical Congress.**—*Plant Dis. Reptr*, 34, 11, pp. 327-333, 1950. [Multilithed.]

The main changes affecting fungi made in the International Rules of Botanical Nomenclature at the 7th International Botanic Congress, Stockholm, are: (1) an expansion of Article 20 f to include Fries's *Elenchus Fungorum* (1828) as part of the *Systema*, which becomes the starting point for all names of 'Fungi caeteri' included therein; but a name published from 1st January 1821 to 31st December 1832 may be legitimate if it was not included by Fries. (2) Article 57 was rewritten to exclude the Phycomycetes from fungi which start with the name applied to the perfect state, and to validate the use of the name of an imperfect state even when a perfect state is known; it specifies that the type specimen of a state of a fungus must bear that state, and excludes the *Uredo* state from the perfect state. The decapitalization of all epithets is now official. From 1st January, 1953, a transfer will be considered validly published only when the original name is clearly indicated with a proper reference. Regulations for determining types were adopted. Several generic names of fungi were conserved, including *Clavaria*, *Daldinia*, *Marasmius*, *Pleurotus*, *Septobasidium*, *Stagonospora*, *Tubercularia*, and *Uromyces*.

Bessey (E. A.) **Morphology and taxonomy of fungi.**—xiii+791 pp., 173 figs., 37 diags., London, Constable & Company, Limited; Philadelphia, The Blakiston Company, 1950. 50*s*.

The author's 'Text-book of Mycology' [*R.A.M.*, 14, p. 708] has been entirely rewritten and greatly enlarged, with the number of illustrations substantially increased, to meet the demands of students of basic mycology as well as of research workers in many fields. An attempt is made to give the user the opportunity to learn the more important characters of almost all the generally recognized orders of fungi, at the same time giving a foundation upon which the more intensive study of any of these groups may be based. Radical revisions have been made in the classification of the lower fungi as well as in the Basidiomycetes, which beyond doubt indicate far more correctly the true relationships of the members of this class. The author, while taking a middle ground concerning many disputed subjects, has

attempted to show the various points of conflict and opposing ideas by incorporating numerous references at the end of each chapter.

A short introductory chapter contains notes on the history of mycology and on nomenclature. The Mycetozoa and related organisms are allotted one chapter, the Phycomycetes five, Ascomycetes three, Basidiomycetes four, Fungi Imperfecti one (56 pages), and phylogeny one. The rusts and smuts occupy the sub-class Teliosporae of the Basidiomyceteae. A useful new feature is the provision of keys to the orders, families, and many genera, including the Imperfecti. The final chapter (96 pages) gives a most useful classified guide to the literature for the identification of fungi.

Garcés O[rejuela] (C.). **El control de las enfermedades de las plantas mediante la inmunización.** [The control of plant diseases by means of immunization.]—*Rev. Fac. Agron. Medellín*, 11, 38–39, pp. 111–139, 1950.

This is a summary and discussion, based on 59 contributions to the relevant literature, of the available information on the control of plant diseases through the development of immunity by selection and hybridization.

Bernaux (P.). **Essai sur le parasitisme dans ses rapports avec l'évolution du tapis végétal.** [An essay on parasitism in relation to the evolution of the plant cover.] —*Mém. Soc. Étud. Sci. nat. Nîmes* 7 (*Coll. Région-pilote Bas-Rhône*, 3, 1), 46 pp., 1 pl., 1950.

Two years' studies were carried out in the natural region of La Costière in the vicinity of Nîmes to ascertain whether the evolution of the plant cover plays any part in the development of fungal parasites and what effect such fungi might have on the plant cover. So far the data obtained are insufficient to answer these questions. The annotated list of fungi found on crop plants, associated weeds, and on the plant succession as the land reverts to forest includes, in addition to those already noticed [*R.A.M.*, 29, p. 479; 30, p. 79], *Cylindrosporium mori* on mulberry, *Phyllosticta maculiformis* [cf. ibid., 15, p. 75] on dead chestnut leaves attached to the tree, *Uromyces striatus* [cf. ibid., 26, p. 110] on lucerne and rough clover, *Lophodermium juniperinum* [cf. ibid., 11, p. 140] on juniper (*Juniperus communis*), *Coleosporium inulae* [cf. ibid., 8, p. 210] on *Pinus halepensis*, and *Hendersonia foliorum* [cf. ibid., 15, p. 745] on *Quercus ilex*. There is a serious danger in abandoned vineyards as foci of infection of disease organisms, particularly *Plasmopara viticola*, and in abandoned or badly kept olive groves as centres of infection for *Cycloconium oleaginum* and *Hysterographium fraxini*.

Crook (Patricia), Carpenter (C. C.), & Klens (P. F.). **The use of sodium propionate in isolating actinomycetes from soils.**—*Science*, 112, 2918, p. 656, 1950.

Studies in the Department of Plant Sciences, Syracuse University [New York], showed that about 0·4 per cent. sodium propionate [*R.A.M.*, 25, p. 174] added to glucose asparagine agar appeared to be optimum for the isolation of pure cultures of actinomycetes from soils [ibid., 30, pp. 432, 530]. The growth of moulds and bacteria was retarded at this concentration, and some actinomycetes were obtained that were not isolated on the usual standard media.

Wilkins (W. H.) & Partridge (Betty M.). **Investigation into the production of bacteriostatic substances by fungi. Preliminary examination of the tenth 100 species, all Basidiomycetes, and review of first 500 Basidiomycetes.**—*Brit. J. exp. Path.*, 31, 6, pp. 754–758, 1950.

Strongly positive reactions to tests by the 'Wilkins revised' method for antibiotic activity against *Bacterium coli* and *Staphylococcus aureus* were given by the following Basidiomycetes out of 100 isolated by the authors at the Mycology Laboratory,

University Department of Botany, Oxford [*R.A.M.*, 28, p. 348]: two strains of *Coprinus picaceus* and one strain each of *Crucibulum vulgare*, *Cyathus striatus* [loc. cit.], *Hygrophorus pratensis*, *Marasmius conigenus* [ibid., 28, p. 582], *M. peronatus* [ibid., 24, p. 391], *Pholiota aegerita* [ibid., 25, p. 25], and *Polyporus betulinus* [ibid., 26, p. 504]. The consistently strongly positive fungi among the first 500 Basidiomycetes studied are of the wood-destroying type, although conversely many members of this group proved uniformly negative. Certain genera, such as *Fomes* and *Clitocybe*, comprise a relatively high proportion of strongly positive species, while others, e.g., *Armillaria*, *Collybia*, and *Mycena*, give typically negative results. The ultimate test for antibiotic activity should be of the 'serial dilution' type. There seems to be no direct relation between the growth rate of a fungus and the degree of its antibiotic activity.

Pramer (D.) & Starkey (R. L.). **Decomposition of streptomycin.**—*Science*, 113, 2927, p. 127, 1951.

In experiments at the New Jersey Agricultural Experiment Station, New Brunswick, streptomycin [*R.A.M.*, 29, p. 433] added to heat-sterilized soil at the rate of 1,000 μgm. per gm. soil lost no activity during a test period of three weeks. In non-sterilized soil, however, more than half of the streptomycin activity had disappeared in one week and was lost completely after two. Bacterial isolates from soils treated with streptomycin grew on a streptomycin medium through several transfers and inactivated the antibiotic. All the isolates were alike and belonged to the genus *Pseudomonas*.

Curtis (P. J.), Hemming (H. G.), & Smith (W. K.). **Frequentin : an antibiotic produced by some strains of Penicillium frequentans Westling.**—*Nature, Lond.*, 167, 4249, pp. 557–558, 1951.

A rather unusual strain of *Penicillium frequentans*, occurring commonly in acid heath soils, produced on Czapek-Dox medium (5 per cent. glucose) after about 10 days at 25° C. an antifungal and weakly antibacterial substance which the authors propose to call 'frequentin'. It is best extracted with carbon tetrachloride.

Germination of the conidia of *Botrytis allii*, *Penicillium gladioli*, *Stachybotrys atra*, and *Mucor mucedo* was prevented by 2·5 μgm. frequentin per ml. at pH 3·5, but 25 to 50 μgm. per ml. were needed to inhibit germination of *Absidia glauca* and *Aspergillus niger*.

Ramakrishnan (C. V.) & Banerjee (B. N.). **Lipase from molds grown on oil seeds.**—*Science*, 113, 2927, p. 125, 1951.

In India, which stands second in world production of oil seeds, millions of tons are spoiled every year by [unspecified] mould growth due to faulty storage and transport. Preliminary studies at the Indian Institute of Science, Bangalore, have shown that lipase from moulds growing on oil seeds is more active than that from the seeds themselves; also that [oil] cake is the best and cheapest medium for the large-scale production of lipolytic moulds [*R.A.M.*, 30, p. 58]. Work is in progress to collect strains of all the lipolytic moulds, and construct a pilot plant for growing them on a large scale and extracting lipase in a pure form.

Sasaki (Y.). **A study of molds in butter.**—*J. Fac. Agric. Hokkaido Univ.*, 49, 2, pp. 121–249, 27 pl., 3 graphs, 1950.

From 1935 to 1938 a detailed study was made of the incidence, growth, and physiology of moulds isolated from monthly butter samples [*R.A.M.*; 27, p. 535, 28, p. 348] from thirteen creameries in Hokkaido, Japan. The reaction of melted

samples in Petri dishes was adjusted to pH 3·5 to 4 with 1 per cent. lactic acid before koji extract-agar was added, and the plates were incubated for 5 to 7 days at 27° C. By this method 518 mould cultures were isolated and classified into 15 genera, 48 species, and 5 varieties, including the new species and varieties [without Latin diagnoses], *Aspergillus yezoensis*, *Penicillium parallelosporum*, *P. ellipticum*, *P. spinulo-ramigenum*, *A. chevalieri* var. *ruber*, *A. versicolor* var. *magnus*, *A. flavus* var. *asper*, and *P. crustosum* var. *spinulosporum*.

Oospora lactis [ibid., 27, p. 250], *O. suaveolens*, *A. repens*, and *Cladosporium herbarum* [ibid., 25, p. 174] were most frequently encountered. *P. roqueforti* was common in all creameries from autumn to spring, but rarely appeared in summer. *Alternaria tenuis* [ibid., 29, p. 404] and *Fusarium* sp. occurred commonly from summer to autumn. *Aspergillus flavus* and *P. yezoensum* were the next most frequent and were found either locally or at particular seasons. *Stemphylium botryosum* var. *botrytis*, *C. herbarum*, and *Alternaria tenuis*, the most common staining moulds of butter, grew actively at 5°. *Aspergillus chevalieri* and its var. *ruber*, *A. ruber*, *A. repens*, and *A. nidulans* survived heating at 70° for 10 minutes. All species of moulds survived 50° for 10 minutes, but were killed at 80°. Only *A. repens*, *A. ruber*, and *A. chevalieri* and its var. *ruber* grew in a 25 per cent. salt medium but all species tolerated 10 per cent. salt. *P. spinulosum*, *Citromyces pfefferianus*, *P. fellutanum*, *P. citreo-viride*, *P. terlikowskii*, *P. sartoryi*, and *P. roqueforti* grew in the presence of 5 per cent. lactic acid. *A. repens* was the most active lipolytic agent, but it did not peptonize milk. *Cladosporium herbarum*, *P. roqueforti*, and *O. suaveolens* were strong decomposers of milk.

Stone (E. L.). **Some effects of mycorrhizae on the phosphorus nutrition of Monterey Pine seedlings.**—*Proc. Soil Sci. Soc. Amer.*, 14, pp. 340–345, 1950.

Pot culture experiments with Monterey pine (*Pinus radiata*) in a synthetic soil medium containing ground phosphatic minerals failed to demonstrate any effect of mycorrhizal infection by *Boletus luteus* on phosphorus uptake by the seedlings [cf. *R.A.M.*, 30, p. 239]. However, in O'Neil sandy loam and Carrington silt loam mycorrhizal formation was followed by accumulation of phosphorus by the plant and resumption of normal growth. Non-mycorrhizal seedlings did not accumulate any considerable quantity of phosphorus from unfertilized soils, but, in the Carrington soil, grew satisfactorily when phosphate was supplied.

It is concluded that much of the mycorrhizal response in pine can be attributed to improved phosphorus nutrition [ibid., 23, p. 238; 25, p. 272].

Yarwood (C. E.). **Water content of fungus spores.** –*Amer. J. Bot.*, 37, 8, pp. 636–639, 1950.

In studies at the University of California, Berkeley, the water content of conidia of *Erysiphe polygoni* [*R.A.M.*, 25, p. 280], *E. graminis* [ibid., 29, p. 15], and *E. cichoracearum* ranged from 52 to 75 per cent. of their fresh weight, while that of uredospores of *Uromyces phaseoli*, and conidia of *Peronospora destructor*, *Penicillium digitatum*, *Aspergillus niger*, *Botrytis cinerea*, and *Sclerotinia fructicola* ranged from 6 to 25 per cent. When corrections for hygroscopic water were made the differences between the two groups were much greater, the physiologically active water content of *E. polygoni* spores, for example, sometimes rising to 15 times that of *U. phaseoli*. The high water content of powdery mildew conidia may account for their ability to germinate at low atmospheric humidities when the spores of most fungi are unable to do so. Calculations based on *S. fructicola* spores and their increase in volume during germination in water indicate that the water content at germination is approximately the same as for powdery mildew conidia, and this may apply to other fungi requiring free water for germination.

Lansade (M.). **Recherches sur la fusariose ou pourriture sèche de la Pomme de Terre, Fusarium caeruleum (Lib.) Sacc.** [Researches on fusariosis or dry rot of the Potato, *Fusarium caeruleum* (Lib.) Sacc.]—*Ann. Inst. nat. Rech. agron.*, Sér. C. (*Ann. Épiphyt.*), 1, 2, pp. 157–207, 13 figs., 23 graphs, 1950.

This is a slightly expanded account of work already noticed from another source [*R.A.M.*, 29, p. 111].

McKee (R. K.). **Mutations appearing in Fusarium caeruleum cultures treated with tetrachlornitrobenzene.**—*Nature, Lond.*, 167, 4250, p. 611, 1951.

In studies carried out under the auspices of the Agricultural Research Council Potato Storage Investigation, at the University of Nottingham, single-spore potato dextrose agar cultures of *Fusarium caeruleum*, which is comparatively stable under normal conditions, were exposed continuously to tetrachlornitrobenzene [*R.A.M.*, 30, p. 72] vapour, 0·01 gm. of the pure chemical being deposited inside the lids of the Petri dishes. The chemical restricts the growth of the fungus *in vitro* but does not prevent it; when the chemical is removed the fungus resumes its normal growth rate. Twenty-eight mutant sectors developed in ten treated plates (at least one in each plate), while none was found in three untreated plates. Certain of the mutant sectors were characterized by a very fast growth rate, although pathogenicity tests [on potato] did not reveal any difference in virulence between these and the normal strains, and it cannot be assumed that they would necessarily cause more dry rot in potatoes treated with tetrachlornitrobenzene than would normal strains. The new strains were concluded to be physiological mutants, distinguished by their ability to resist the fungistatic action of the vapour. This resistance remained unaltered after passage of the fungus through potato tubers. Strains resistant to the vapour may arise in soil adherent to treated potato tubers and be distributed later among the soil population.

Black (W.) & Mezzetti (A.). **Biotipi di Phytophthora infestans de By in Italia.** [Biotypes of *Phytophthora infestans* de Bary in Italy.]—*Boll. Staz. Pat. veg. Roma*, Ser. 3, 6, pp. 123–127, 1948 (issued 1950). [English summary. Received February, 1951.]

In studies at the Scottish Plant Breeding Station, Corstorphine, Edinburgh, and at the Station of Plant Pathology, Rome, isolates of *Phytophthora infestans* from potato tubers grown in different parts of Italy [cf. *R.A.M.*, 3, p. 196; 16, p. 132; 30, p. 99] and from leaves of tomatoes grown near Rome fell into three strains, as determined by inoculation on differential varieties. One resembled Black's strain A [loc cit. and ibid., 26, p. 506], but was not identical with it, while the other two could not be identified with any of Black's strains (A to F), using his standard series of differential hosts.

Gretchushnikov (A. I.) & Yakovleva (Mme N. N.). Изменение активности пероксидазы у ракоустойчивых и восприимчивых к раку сортов Картофеля в процессе их заражения **Synchytrium endobioticum Schilb. (Perc.).** [Changes in the activity of peroxidase in wart resistant and susceptible Potato varieties during their infection with *Synchytrium endobioticum* Schilb. (Perc.).]—*C. R. Acad. Sci. U.R.S.S.*, N.S., 73, 1, pp. 207–208, 1950.

In studies carried out in 1950 in the U.S.S.R. tuber sprouts of potato varieties resistant to wart (*Synchytrium endobioticum*) [*R.A.M.*, 20, p. 320], namely, Berlichingen and Ostbote [ibid., 25, p. 78], and the susceptible ones Wahle and Wohltmann [ibid., 30, p. 119] were inoculated with zoospores of the fungus, which penetrated into the cells of all the varieties. Twelve hours after inoculation, peroxidase activity was greater in the infected plants than in the uninfected

controls, especially in the resistant varieties. One hour after inoculation peroxidase activity was greater in Berlichingen than in Wahle, but after five hours there was increased activity in Wahle, which was associated with abnormal growth of the tissues and the formation of sporangia. After ten hours Wahle developed tumours which caused a decrease in peroxidase activity. The increased activity in infected sprouts is considered to be a protective reaction.

Boothroyd (C. W.). **Pink rot of Potato found in New York State.**—*Plant Dis. Reptr*, 35, 1, p. 55, 1951. [Multilithed.]

Katahdin potato tubers from Orchard Park, New York, in 1950, were affected with pink rot, caused by *Phytophthora erythroseptica* [C.M.I. map No. 83; *R.A.M.*, 25, p. 8]. A low portion of the field from which the tubers came was under water several days in September, and over 50 per cent. of the crop in this area was left in the field because of the rot. Of the stored tubers about 10 per cent. developed pink rot less than one month after digging.

The disease is considered to be of little economic importance except in some low-lying, wet areas.

Lansade (M.). **Recherches sur le flétrissement bactérien de la Pomme de Terre en France, Corynebacterium sepedonicum (S. et K.) Skapt. et Burkh.** [Researches on bacterial wilt of Potato in France, *Corynebacterium sepedonicum* (S. & K.). Skapt. & Burkh.]—*Ann. Inst. nat. Rech. agron.*, Sér. C. (*Ann. Épiphyt.*), 1, 2, pp. 69–156, 39 figs., 1950.

This is an expanded account of work already noticed from another source [*R.A.M.*, 30, p. 120]. Potato varieties which were scarcely attacked in inoculation tests from 1941 to 1949 with *Corynebacterium sepedonicum* [ibid., 27, p. 537] were Arran Peak (no infection in 1946), Belle de Fontenay (none in six years, some infection in three), B.F. 15 (none in 1948 and 1949), Dorst U. 243 (none in 1949), Alpha (none in three years, some in 1948), Draga (none in three years, some in 1946), Pontiac, Epicure and Katahdin (none in 1945), Krebsfeste Kaiserkrone and Frühbote (none in 1943), Ratte (none in four years, slight in 1947), Rosa (slight infection in 1941, none since), Wohltmann (slight in 1941, none in the following three years), and Furore (no infection in ten years).

Jones (E. W.). **Production in Potato of leaf symptoms observed on plants on acid soils together with associated tuber necrosis.**—*Nature, Lond.*, 167, 4249, pp. 568–569, 2 figs., 1951.

During an investigation at Long Ashton, Bristol, of the interrelationships of iron, potassium, and phosphorus in Majestic potato plants grown in sand culture, characteristic symptoms, hitherto noticed only in the field in acid soils, were observed in the upper leaves. The leaflets had pale yellow-green or whitish intervenal mottling at the base of the lamina; later they became wavy, curled up at the margin, and, in severe cases, the basal region became chlorotic. These symptoms were mainly due to readily available iron, provided either in solution or by increasing the availability of a low iron status with luxury concentrations of potassium. Later, symptoms typical of calcium deficiency developed, and two distinct types of tuber necrosis were observed. (1) External necrosis was present only in the highest potassium treatments. It originated at the 'rose' end of the tuber and was visible as a partially rotted area mainly in the cortex. (2) Medullary necrosis began as necrotic spots in the middle of the medulla, causing rotting of the entire region of externally normal tubers. It always occurred in malformed, calcium-deficient tubers and the symptoms differed from those described by Quanjer [*R.A.M.*, 5, p. 572]. Applications of potassium increased, and phosphorus decreased significantly the incidence of medullary necrosis.

McClure (T. T.). **Fusarium foot rot of Sweet-Potato sprouts.**—*Phytopathology*, 41, 1, pp. 72–77, 1 fig., 1951.

Three out of seven monospore cultures of *Fusarium solani* isolated from shrivelled Porto Rico Red sweet potato roots from the San Joaquin Valley, California, proved to be mildly pathogenic to sprouts of the same host, causing a limited black foot rot termed *Fusarium* foot rot. Infection did not advance beyond the basal node, nor did the rot extend more than 1 cm. along the roots. The fungus was found to be a wound parasite unable to attack intact stems or roots. The strains of *F. solani* pathogenic to sweet potato are considered to constitute a new form, *F. solani* f. *batatas*. Single-spore cultures did not develop perithecia, but when they were grown with conidial cultures of other pathogenic isolates or of *Hypomyces ipomoeae* [*R.A.M.*, 30, p. 289] perithecia and ascospores were produced. Freshly cut sprouts inoculated with the pathogenic isolates were protected from subsequent infection by *F. oxysporum* f. *batatas* [*F. bulbigenum* var. *batatas*: ibid., 30, p. 137], even when only a day or less elapsed between inoculations. Tyloses were formed in abundance in the xylem in advance of the foot rot pathogen.

Altson (R. A.). **Report for the period January, 1941–August, 1945. Pathological Division.** *Rep. Rubb. Res. Inst. Malaya, 1941–1945*, pp. 41–68, 1950.

In this report [cf. *R.A.M.*, 27, p. 336] the results of field experiments [ibid., 20, p. 34] to study the control of root diseases of rubber (*Ganoderma pseudoferreum*, *Fomes lignosus*, *F. noxius*, *Ustulina zonata*) [ibid., 29, p. 170] in connexion with replanting are summarized. Experiments B.K. 1 and H. 1 were started in 1937, B.K. 2, H. 2, and L.P. 1 in 1938, and G.I. in 1940. Up to the end of 1941 it was clear in the B.K. 1 (inland) plots previously infected with *G. pseudoferreum* that stump-poisoning with sodium arsenite was an inadequate substitute for digging, there being 189 infected rubber trees and groups of leguminous bushes killed by root disease compared with 78 to 140 for other pre-planting treatments. The relative distribution of total disease incidence caused by *F. lignosus* was unchanged under all the treatments. There was no decline in the incidence from 1938 (10 to 35 rubber trees and groups of bushes diseased) to 1941 (16 to 41), using the poisoning treatment [cf. ibid., 21, p. 391; 30, p. 191]. The total incidence of infection under bush covers was 471 and cost of treatment 15·84 cents per acre for rubber trees, and 975 and 18·14 for bush groups, compared with 565 and 23·43, respectively, for rubber trees only in creeping leguminous cover.

In experiment H. 1 (coastal) complete eradication of infected roots and stumps of apparently healthy trees continued to be the cheapest and most effective treatment. Experiment B.K. 2 (inland) supports the results of B.K. 1 regarding the unreliability of poisoning stumps. The incidence for *G. pseudoferreum* up to the end of 1941 for poisoned and untreated stumps was 15 and 9, respectively, and for *F. lignosus* 7 and 16. The incidence of infection in experiment H. 2 (coastal) for frill-girdling (dug to 18 in. and all roots removed), with and without poisoning, and for stumps poisoned and untreated was 137, 108, 111, and 151, respectively. The ineffectiveness of the first treatment has not been satisfactorily explained. The high cost of treatment in all cases is a serious objection. Root disease was much lower in the presence of a ground cover.

The results for experiment C.P. 1 (coastal) were anomalous. Records for G. 1 (inland) for one round of inspection in 1940 indicated that sodium arsenite is more effective than sodium chlorate, the percentage of stumps with no live roots for those poisoned with the former as standing trees or stumps being 95·5 and 94·1, respectively, and with the latter 43·1 and 72, respectively. The untreated had 11·5.

Mouldy rot (*Ceratostomella fimbriata*) was prominent on small holdings and estates in 1942. Outbreaks of pink disease (*Corticium salmonicolor*) were also

reported. The incidence of *Oidium heveae* in 1941 was the lowest for 10 years, as a result of unfavourable weather.

Stárka (J.) & Musílek (V.). **Study of the aerobic bacteria and fungi participating in decomposition of cellulose in the soil.** —*Stud. bot. čechosl.*, 11, 4, pp. 191–197, 3 figs., 1950.

Aschner's method, based on the ability of *Acetobacter xylinum* to form membranes of pure cellulose (*J. Bact.*, 33, 1937), with modification, proved far superior to Winogradsky's silica gels (*Ann. Inst. Pasteur*, 43, p. 549, 1929) for determining the quantity and relative representation of cellulose-decomposing bacteria and fungi in the soil, their isolation, identification, and the quantitative evaluation of the degree of decomposition.

The method consists of growing *A. xylinum* on wort in Petri dishes of a certain diameter; the membranes when 2 to 3 mm. thick and covering the dish are removed, washed, and steeped in sodium hydroxide solution to eliminate bacterial remains, neutralized in hydrochloric acid and washed. They are then sterilized in Winogradsky's mineral nutrient solution, placed on small disks of filter paper in Petri dishes, and inoculated with the cultures to be tested or with soil extracts.

Szkolnik (M.). **Phytophthora parasitica diseases of Cinchona in Central American field plantings.**—*Plant Dis. Reptr*, 35, 1, pp. 16–24, 2 figs., 1951. [Multilithed.]

Cinchona losses due to *Phytophthora parasitica* [*R.A.M.*, 24, pp. 289, 387, 431; 28, p. 377] in Guatemalan and Costa Rican field plantations have been exceptionally heavy each year during the wet season. Isolations and inoculations prove that the fungus is responsible for two dissimilar phases of disease: top blight and girdle canker. The former affects trunk sprouts, branches (less commonly, though under wet conditions most of the branches may be killed within ten days), and young nursery stock of susceptible varieties, while girdle canker attacks the trunk. Top blight of sprouts is characterized by initially circular, coffee brown spots on leaf, petiole, or stem, which later enlarge and coalesce. Infection often spreads to the main trunk, causing girdle canker, which can also be induced by natural infection through injured or uninjured bark. From the infected brown tissue underneath the bark, cankers usually advance most rapidly upwards. Rapidity and extent of canker development depends on the degree of tree susceptibility and on the strain and viability of the fungus. Canker infections on artificially inoculated trunks of the very susceptible hybrid clone Z-56 developed nearly 50 cm. above and below the site of inoculation within 3 months, some trunks being completely girdled within one month. The cankers on the very tolerant hybrid clone Z-630 extended scarcely 2·5 cm. above and below the site of inoculation, the lateral extent being less than 2 cm. in three months. Complete girdling causes rapid decline of the upper portion of the tree. Trunk girdle canker of short duration apparently has little, if any, adverse effect on the production of quinine alkaloids. *Cinchona ledgeriana* and related hybrid clones are most susceptible, while *C. succirubra* and related hybrid clones (of little commercial value) show a high degree of tolerance of most strains of the pathogen.

Field observations and inoculation studies showed that strains of *P. parasitica* exist. Although various isolates appeared identical in culture, growth rates differed significantly; the isolates also differed with respect to the rate of growth and size of cankers on inoculated trunks. Thus isolates NL 153 from the soil and NL 444 from cankers on *C. succirubra* were much more virulent than others. Certain clones differed in their response to infection by different strains of the fungus. *C. ledgeriana* hybrid clone H-1229 was more resistant to NL 153 when inoculated than to natural infection.

The spread of the disease is favoured by cool, wet weather, dense plantings, poor exposure, and other conditions which prevent adequate drying of plantings.

Ling (L.). **On the occurrence of Colletotrichum derridis in Taiwan.**—*Plant Dis. Reptr*, 35, 1, pp. 13–15, 4 figs., 1951. [Multilithed.]

The disease of *Derris elliptica* caused by *Colletotrichum derridis* [*R.A.M.*, 29, p. 476] has been present in Formosa since 1940, causing heavy damage throughout the island, but especially in nurseries in Taichung and Hwalienkong. It was probably introduced with cuttings from Malaya. The disease has also been reported from Hainan Island.

The leaves, petioles, and stems of both young and mature plants are affected. Surviving diseased plants are considerably stunted. Young plants inoculated with a spore suspension developed initial lesions in about ten days. Lesions on petioles became obvious after 15 to 20 days, and the upper parts of the plants usually died shortly afterwards.

Conidia developed in culture both in acervuli and terminally on undifferentiated hyphae. The optimum temperature for mycelial development and germination of the conidia was 28° C., the maximum between 35° and 40°.

For control, selection of disease-free cuttings and field sanitation are recommended. The removal and burning of infected plants and debris reduce sources of secondary inoculum. *D. chinensis* is highly resistant, but commercially of little importance.

Steib (R. J.) & Chilton (J. P.). **The Phytophthora rot of Sugarcane seed pieces in Louisiana.**—*Sug. Bull., N.O.*, 29, 5, pp. 69, 77–78, 1950.

Particulars are given of inoculation experiments carried out with *Phytophthora erythroseptica* and two as yet undetermined strains of the same genus isolated in 1947 from rotted sugar-cane seed pieces in Louisiana [*R.A.M.*, 29, p. 382]. Out of 2,017 nodes and internodes planted in inoculated soil, 51·5 per cent. yielded *Phytophthora* in the spring of 1948. On 28th December the average infection ratings for *P. erythroseptica* and the two unidentified strains on CP 36–13, Co. 290, CP 34–120, CP 29–320, and CP 29–116 inoculated on 20th November and then buried were 4·1, 2·5, 2·4, 2·4, and 2·5, respectively (0 representing no spread and 5 much spread of infection through the stalk), the corresponding figures on 21st February, 1949, being 3·9, 3·4, 3·1, 2·9, and 2·1, and on 3rd March 4·9, 3·8, 3·8, 4·1, and 3·4, respectively. There seems to be little doubt that the *Phytophthora* rot is of considerable importance, particularly in wet areas of the State.

Ramakrishnan (T. S.) & Ramakrishnan (K.). **Additions to fungi of Madras—IX.** *Proc. Indian Acad. Sci.*, Sect. B, 32, 5, pp. 205–214, 10 figs., 1950.

This further instalment of the authors' critically annotated list of Madras fungi [*R.A.M.*, 30, p. 195] comprises, besides ten new species, records of *Septoria dianthi* on carnation and other cultivated *Dianthus* spp. [ibid., 26, p. 130; 29, p. 89, *et passim*], *S. phlogis* on *Phlox* sp. [ibid., 17, p. 654], and *Cercospora hibisci*, commonly forming olive-brown or sooty, vein-delimited patches on the lower surfaces of *Hibiscus esculentus* leaves [ibid., 24, p. 388].

Pilát (A.). **Contribution to the knowledge of the Hymenomycetes of Bialowieża virgin forest in Poland.**—*Stud. bot. čechosl.*, 11, 4, pp. 145–173, 22 figs., 1950.

This is a list [annotated in Latin] of the less common Hymenomycetes collected by the author during a five-day visit to the Bialowieża virgin forest, Poland, in October 1950. It includes *Leptoporus* [*Polyporus*] *borealis* [*R.A.M.*, 27, p. 547], *Trametes abietina* [*Polystictus abietinus*: ibid., 26, p. 88], *T. serialis* [ibid., 30,

p. 205], *Fomes roseus* [ibid., 30, p. 18], and *Phellinus* [? *Fomes*] *abietis*, all common on Norway spruce (*Picea excelsa*); *T.* [*Polyporus*] *biformis* [ibid., 26, p. 556], *T. gibbosa*, and *T. hirsuta* [*Polystictus hirsutus*] on deciduous trees; *T. zonata* [*Polyporus zonatus*: ibid., 26, p. 88] and *Phellinus* [*F.*] *igniarius* var. *tremulae* on aspen (*Populus tremula*), *Phellinus laevigatus* [*F. igniarius* var. *laevigatus*: ibid., 15, p. 620] and *Inonotus* [*Irpex*] *obliquus* on birch (*Betula verrucosa*); and *Phellinus* [*F.*] *pini* [ibid., 30, p. 85] on Scots pine.

Zacha (V.). **Additamentum ad floram Moraviae micromycetum II.** [Addition to the microfungal flora of Moravia II.]—*Sborn. Kl. přír. Brně*, 28, pp. 130–136, 1948. [Received December, 1950.]

This addition to an earlier list of fungi collected in Moravia (*Sborn. Kl. přír. Brně*, 26), includes *Synchytrium anemones* on anemone and *Septogloeum mori* on mulberry [cf. *R.A.M.*, 27, p. 349; 29, p. 517].

Fisher (Eileen E.). **Some 'sooty moulds' collected in Queensland.**—*Proc. roy. Soc. Vict.*, N.S., 62, 2, pp. 129–135, 1 pl., 1 fig., 1950.

Descriptions are given of the following sooty moulds collected in Queensland [cf. *R.A.M.*, 18, p. 627]; *Setella halophila* n.sp., the first record of this genus in Australia, *Asterina systema-solare* var. *minor* n.var. on leaves of *Banksia robur* and its var. *minor*, and *Meliola polytricha* var. *queenslandica* n.var. on *Callistemon viminalis*. *Chaetothyrium citri* [ibid., 19, p. 304] is recorded for the first time in Queensland. Both this and *S. halophila* occur on the leaves of *Aegiceras corniculatum*, a mangrove which excretes salt in large quantities.

Dennis (R. W. G.). **An earlier name for Omphalia flavida Maubl. and Rangel.**—*Kew Bull., 1950*, 3, p. 434, 1950.

Omphalia flavida Maubl. & Rangel (1914) [*R.A.M.*, 29, p. 478] is antedated by *Agaricus citricolor* Berk. & Curt. (1868), the type of which bears the gemmifers later named *Stilbum flavidum* Cooke. The fungus is a *Mycena*, and should be known as *M. citricolor* (Berk. & Curt.) Sacc.

Goidànich (G.), Ruggieri (G.), & Gagnotto (Anna). **Presenza di una terza forma di moltiplicazione agamica in Deuterophoma tracheiphila Petri.** [The presence of a third type of agamic fructification in *Deuterophoma tracheiphila* Petri.]—*Boll. Staz. Pat. veg. Roma*, Ser. 3, 6, pp. 107–111, 4 figs., 1948 (issued 1950). [English summary. Received February, 1951.]

This is a reprint of a paper already noticed from another source [*R.A.M.*, 28, p. 422].

Annual Administration Report for 1949–50. Tea Scientific Section United Planters' Association of Southern India.—27 pp., 2 graphs, 1950.

In this report [cf. *R.A.M.*, 29, p. 57] the section (pp. 12–14) dealing with the control of tea blister blight [*Exobasidium vexans*: ibid., 30, p. 197] in which all the members of the staff co-operated, states that in seedling spraying trials in southern India in 1949 repeated weekly applications of malachite green failed to control the disease; dithane (2 quarts in 100 gals.) and fermate (1½ lb.) were less effective than perenox (2 oz. in 10 gals.), product 1001 (a proprietary preparation containing 30 per cent. DDT and presumably copper sulphate) at 1 lb. in 30 gals., wetcol (1 lb. in 15 gals.), and copper Sandoz (2 oz. in 10 gals.), which were about equal; wetcol (2 oz. in 10 gals.) was less effective than perenox at the same dilution, probably because of its lower copper content. The mean efficiency of perenox was only 76 per cent.

In the report of the Botanist, K. S. Venkataramani (pp. 21–27), it is stated that

E. vexans remains the most important leaf disease of tea. Sporadic attacks of *Phoma theicola* [ibid., 17, p. 71] occurred on a few estates, especially during dry weather. A species of *Helminthosporium* causing a brown blight leaf disease attacked a few bushes at the Tea Experiment Station, Devarshola; the disease did not appear to spread. There was a marked increase in the number of bushes killed by *Fomes noxius* [ibid., 20, pp. 127, 137; 30, p. 197].

One bush at the Station displayed remarkable resistance to blister blight. Though it was pruned during the blister blight season no blisters developed on it. Artificial inoculations in the field and the laboratory also failed, though a few spots (which did not develop into blisters) formed at the points of inoculation. Work is in progress on the nature of the resistance shown by this bush.

'Defoliation' [ibid., 29, p. 436] was reported from some estates in the Wynaad, and again no micro-organism was associated with the affected bushes. Many dead bushes uprooted during dry weather at the Station harboured *Botryodiplodia theobromae* [ibid., 30, p. 181], indicating lack of vitality in the bush and shortage of carbohydrate reserves in the roots; these were invariably deficient in starch. 'Defoliation' would appear to be a physiological disorder induced by a limited water supply or nutritional unbalance or both.

Takahashi (W. N.). **Ultraviolet absorption as a measure of Tobacco-mosaic virus nucleoprotein.**—*Phytopathology*, 41, 2, pp. 142–145, 1 graph, 1951.

Following a survey of some contributions to the literature dealing with various methods for the determination of tobacco mosaic virus concentration, the writer briefly describes a rapid and simple technique, based on ultra-violet (265 mμ) absorbancy, which will acount for the non-infective and aggregated virus nucleoprotein as well as the active unit virus [*R.A.M.*, 29, pp. 177, 279, *et passim*].

Sharp (D. G.) & Wolf (F. A.). **The virus of Tobacco leaf curl. II.**—*Phytopathology*, 41, 1, pp. 94–98, 1 fig., 1951.

A particulate material, physically distinct from that of other tobacco viruses, was isolated by ultracentrifugation at Duke University, Durham, North Carolina, from the formolized sap of leaf curl-affected tobacco plants obtained from Venezuela [*R.A.M.*, 28, p. 491]. Its sedimentation constant is S = 75 units. Electron micrographs of concentrates of the material reveal large numbers of soft, roughly spherical bodies, with a mean individual diameter of 39 mμ, which become flattened on the supporting film in course of preparation. It may be presumed (though positive proof appears impracticable under present conditions) that the particles are the actual infectious agent of leaf curl.

McWhorter (F. P.). **Suggestions for transferring virus from local lesions to test plants.**—*Phytopathology*, 41, 2, p. 185, 1951.

At the Oregon Agricultural Experiment Station the following procedure has proved effective in the transmission of virus inoculum from local lesions to test plants, being particularly useful in the case of difficult transfers, such as that of the readily inactivated [tomato] spotted wilt virus. One end of a small glass or metal tube is ground until the edges are sharp and a rubber nipple mounted at the other end. A blotter or cardboard is placed under the leaf and the tube rotated on the lesion, so that the tissue is quickly and cleanly cut from the leaf. It is then blown by the nipple on to a droplet of a suitable diluent on a 1 to 2 in. square ground-glass plate. The tissue is emulsified in the droplet according to Samuel's method [*R.A.M.*, 11, p. 334] with a ground-glass spatula, which is then used to make transfers of the inoculum to the test plants, the time required for the whole operation being only 15 seconds.

Fulton (J. P.) & Fulton (N. D.). **Phytophthora root rot of Tomatoes.**—*Phytopathology*, 41, 1, pp. 99–101, 1951.

A fungus isolated from wilted and dying field-grown Fortune tomato plants with extensively rotted roots in July, 1949, at the Arkansas Agricultural Experiment Station presented the essential cultural characteristics of *Phytophthora parasitica* [*R.A.M.*, 10, p. 754; 21, p. 171; 27, p. 111].

Zoospore inoculum proved to be uniformly virulent to the Fortune, Rutgers, Bonny Best, Marglobe, and Stokesdale varieties at different ages in the greenhouse at a temperature of about 80° F., and no consistent differences in varietal reaction could be detected. Zoospore inoculum of two buckeye rot isolates [ibid., 28, p. 36] proved equally virulent with the Arkansas isolate on Fortune and Rutgers. Young, green fruits inoculated with zoospores of the Arkansas isolate and two isolates from buckeye rot developed typical buckeye rot symptoms. Symptoms developed most rapidly on young plants as a very quick decay and collapse of the tap-roots and stems. Older plants were generally attacked either at the tip of the tap-root or at soil level. In others only the lower inch or two of the tap-root was rotted; above this portion there was excessive development of lateral roots. The extensive vascular discoloration of the stem noticed in some of the diseased field plants was never duplicated in the greenhouse, though some specimens showed a slight browning, apparently due to the deposition of a brown material in the vessels and not related to the fungal invasion of the vascular system. From the results of greenhouse trials it appears that the roots must be severely damaged before wilting symptoms develop, and the mere stunting of mildly affected plants might well be overlooked in the field without a careful examination of the underground system.

Giggard (E.), Cox (C. E.), & Kramer (A.). **Effect of spray schedule on Tomato quality.**—*Food Packer*, 31, 13, pp. 46–48, 3 graphs, 1950.

Studies were undertaken at the Maryland Agricultural Experiment Station to determine the effects of spraying on the grade of Rutgers tomatoes, losses from trimming and peeling, and quality of the canned fruits and juice. The joint disease and insect control spray schedule comprised five treatments between 1st July and 12th August, the first two consisting of ziram [*R.A.M.*, 29, p. 221] at a concentration of 2 lb. per 100 gals., and the remaining three of tribasic copper sulphate (4–100), all applied at a rate of 200 gals. per acre. Calcium arsenate (4–100) was added to the final spray.

The total yields for the sprayed and control plots were 9·6 and 7·7 tons per acre, respectively, the 25 per cent. increase in the former being composed entirely of U.S. No. 1 and No. 2 grade fruit.

Spraying did not influence the amount of loss incurred in the skinning or coring operations, but reduced by 7 per cent. that resultant on trimming. Thus, through increase in yield and reduction in trimming loss the sprayed plots produced 32 per cent. more fruit fit for canning than the untreated. The effect of the sprays became increasingly beneficial as the season advanced. Thus, trimming losses in the unsprayed plots rose markedly on 18th August and 7th September, while there was no corresponding sharp increase in the treated. The cool, rainy weather prevailing in these weeks favoured the development of [unspecified] fruit rots, which were controlled by the sprays.

Pound (G. S.). **Effect of air temperature on incidence and development of the early blight disease of Tomato.**—*Phytopathology*, 41, 2, pp. 127–135, 3 figs., 1 graph, 1951.

In comparative laboratory studies at the University of Wisconsin on four culturally distinct isolates of *Alternaria solani*, all grew well on potato dextrose agar over a wide temperature range, with an optimum at 24° to 28° C., the spores

germinating from 8° to 32° [cf. *R.A.M.*, 21, p. 432]. In three years' greenhouse inoculation experiments on Bonny Best tomato plants, two isolates caused markedly less foliar infection in plants maintained in humidity chambers at 13° and 17° for 48 hours before transferring to the bench at the same temperature than in those kept at 21° and 25°. The other two strains caused appreciable infection at all four temperatures. After the completion of the infection process, using relatively dilute inoculum, disease development was much more abundant at 16° than at 28°, the gradient of severity increasing from the latter to the former temperature. However, when the inoculum was fairly concentrated, three of the four isolates caused equally severe infection throughout the range from 13° to 25°, due to the more extensive involvement of the vascular tissue. Interveinal leaf lesions seldom developed beyond the fleck stage with any of the isolates at 28° [cf. ibid., 30, p. 292].

The collar rot phase of early blight [ibid., 13, p. 195; 22, p. 116] was similarly influenced by temperature, all four strains producing progressively more virulent symptoms from 28° to 16°.

Ciccarone (A.) & Carilli (A.). **Osservazioni di campo su Corynebacterium michiganense (Smith) Jensen e considerazioni su un possibile caso di sua sopravvivenza nel terreno.** [Field observations on *Corynebacterium michiganense* (Smith) Jensen and considerations on a possible instance of its survival in the soil.]—*Boll. Staz. Pat. veg. Roma*, Ser. 3, 6, pp. 177–179, 1 fig., 1948 (issued 1950). [English summary. Received February, 1951.]

In the autumn of 1949 and again in 1950 tomatoes in Italy were infected by *Corynebacterium michiganense*, apparently not recorded locally since 1915 [cf. *R.A.M.*, 9, p. 276; C.M.I. map No. 26]. Inoculations of young tomato plants gave positive results. The disease was prevalent in various parts of the plain of Salerno and was most injurious in other localities where its presence had not been suspected, e.g., in Vittoria, Sicily, where the affected plants wilted early in July. Near Salerno, Fiascello Nano tomatoes showed serious infection in the first half of June, about five weeks after transplanting, and two widely separated plots were almost completely destroyed. These plants had been grown from seed disinfected before sowing with mercuric chloride 1 in 1,000 and the seed bed had been treated with 2 per cent. formalin. The field had not been planted with susceptible crops during the previous four years. It appears possible that the organism may have survived in the soil from 1946 to 1950.

Kidson (Elsa B.). **'Hard-core'—a nutritional disorder of Tomatoes.**—*J. hort. Sci.*, 26, 1, pp. 8–21, 1 pl., 1950.

'Hard core' of tomatoes is increasing in severity and becoming more widespread in the Nelson district, New Zealand [*R.A.M.*, 26, p. 231; 27, p. 117; 30, p. 22]. Work during recent years at the Cawthron Institute has demonstrated that the heavy-cropping varieties are especially susceptible to the disorder. Bonny Best and Marglobe, with a smaller fruit yield, are not severely affected. Plants with severe 'hard core' had a low potassium content of both leaves and fruit. Increased nitrogenous fertilizers (an extra standard application) with heavy potash dressings (standard plus 2 tons potassium sulphate per acre) reduced 'hard core' to 7 per cent. with 10·4 lb. tomatoes per plant, compared with 47 per cent. and 7·2 lb. for non-fertilized.

Yarwood (C. E.). **Defoliation by a rain-favored, a dew-favored, and a shade-favored disease.**—*Phytopathology*, 41, 2, pp. 194–195, 1 fig., 1951.

Sycamore [*Platanus occidentalis*] anthracnose (*Gnomonia veneta*) [*R.A.M.*, 29, p. 589 and next abstract] is cited as an outstanding example of a disease which tends to become epiphytotic during the spring rainy season in California [cf. ibid.,

29, p. 317]. Following defoliation of all but the upper leaves, the trees put out lower leaves which remain relatively free from the disease during the dry summer.

On the other hand, the uredo stages of rusts may be more abundant in the absence than in the presence of rain [ibid., 19, p. 161; 27, p. 190; 29, p. 6]. Uredospores are disseminated by wind, presumably in a uniform manner over the plant, but the dews necessary for their germination occur principally on the upper and outer leaves, which have been shown by several years' observations in the centre of the State to sustain the most severe damage in the case of the prune and apricot rust caused by *Tranzschelia* [*Puccinia*] *pruni-spinosae* [ibid., 27, p. 139]. In epiphytotic seasons, which do not appear to be correlated with late spring or early autumn rains, the rust usually becomes prominent on prune in the late summer, causing defoliation from the top downwards.

The powdery mildews usually thrive under shade and in dry weather [ibid., 21, p. 282; 26, p. 194; 29, p. 317]. This relationship is very well exemplified by apricot powdery mildew (*Podosphaera tridactyla*) [*P. myrtillina*], which is commonly present on the lower and inner foliage of trees in the Santa Clara Valley in the dry late summer and autumn; sometimes many of the inner leaves are shed.

THOMPSON (G. E.). **Die-back of Sycamore.**—*Plant Dis. Reptr*, 35, 1, pp. 29–30, 2 figs., 1951. [Multilithed.]

A die-back of sycamore (*Platanus occidentalis*) caused by *Diplodia natalensis* [*R.A.M.*, 29, p. 548] was observed near Athens, Georgia, during the summers of 1949 and 1950. In the most severely infected area (along a little stream) 40 per cent. of the trees were in various stages of degeneration, from those with a few dying branches to dead trees. The disease apparently spread from small branches to the large ones and finally into the trunk.

Inoculations made on 21st June, 1950, by inserting pieces of mycelium and conidia under the bark of branches and stems of young, healthy trees resulted in the development of sunken lesions and streaks in the xylem of all trees by 3rd July. The fungus was re-isolated. It is suggested that the rapid development of *D. natalensis* was due to the weakened condition of the trees, following severe attacks of anthracnose [*Gnomonia veneta*: see preceding abstract].

BIRAGHI (A.). **Prove di inoculazione di Castagni con Endothia sp. isolata in Biscaglia.** [Inoculation experiments on Chestnut with a species of *Endothia* isolated in Biscay.]—*Boll. Staz. Pat. veg. Roma*, Ser. 3, 6, pp. 113–117, 1948 (issued 1950). [English summary. Received February, 1951.]

This is a reprint of a paper already noticed from another source [*R.A.M.*, 28, p. 427].

CAMICI (LEONTINA). **La 'mummificazione delle Castagne' da Phomopsis viterbensis sp. n.** [Mummification of Chestnuts caused by *Phomopsis viterbensis* n. sp.]—*Boll. Staz. Pat. veg. Roma*, Ser. 3, 6, pp. 79–88, 8 figs., 1948 (issued 1950). [English summary. Received February, 1951.]

This is a reprint of a paper already noticed from another source [*R.A.M.*, 28, p. 314].

BRETZ (T. W.). **Oak wilt fungus pathogenic to Chinese Chestnut.**—*Plant Dis. Reptr*, 35, 1, p. 28, 1951. [Multilithed.]

Four young Chinese chestnut trees (*Castanea mollissima*) were inoculated with an isolate of *Chalara quercina* from an infected *C. mollissima* tree [*R.A.M.*, 30, p. 252] and two with another isolate from northern red oak (*Quercus borealis*). Typical wilt symptoms developed after 27 days. The fungus was re-isolated from five of the trees.

Fergus (C. L.). **Strumella canker on Bur Oak in Pennsylvania.**—*Phytopathology*, 41, 1, pp. 101–103, 1 fig., 1951.

In the winter of 1948 extremely severe infection by *Strumella coryneoidea* [*R.A.M.*, 27, p. 502] was observed on young burr oaks (*Quercus macrocarpa*) forming part of a 20-year-old mixed plantation at the Pennsylvania State College and not hitherto recorded as susceptible to the fungus [ibid., 13, p. 406]. Out of 260 trees in the stand 30 had been killed and another 100 bore cankers, which are very difficult to detect in the early stage because of the roughness of the bark. The presence of the pathogen, however, may be marked by a profusion of water sprouts below the canker and a slight depression of the bark. Masses of black sporodochia and conidia of the fungus, giving the impression of 'gunpowder', covered the dead branches and water sprouts and the trunks of killed trees. Isolations yielded cultures agreeing in all respects with the published descriptions of *S. coryneoidea*.

Infection probably originated in the mixed natural stands containing cankered oaks within 900 ft. of the plantation. The burr oaks were planted in 6- by 6-ft. spacings and had made poor growth on the semi-hardpan, ill-drained soil.

Liming (O. N.), Rex (E. G.), & Layton (K.). **Effects of a source of heavy infection on the development of Dutch Elm disease in a community.**—*Phytopathology*, 41, 2, pp. 146–151, 1 diag., 1951.

At the centre of a study plot in a residential area in Essex County, New Jersey, a large-crowned, 40-in. elm was infected by *Ceratostomella ulmi* [*R.A.M.*, 30, p. 294] in 1934 and killed by the resultant Dutch elm disease in 1944. During 1943 and 1944 thousands of bark beetles (*Scolytus multistriatus*) [ibid., 28, p. 257; 29, p. 391], carriers of the fungus, escaped from this tree. In 1944 the number of elms contracting infection within a zone limit of 0 to 400 ft. was 29 out of 64; 401 to 800 ft., 9 out of 124; 801 to 1,200 ft., 27 out of 372; 1,201 to 1,600 ft., 2 out of 262; 1,601 to 2,000 ft., 0 out of 237; and 2,001 to 2,640 ft., 2 out of 294; in 1945 the corresponding figures were 8, 5, 18, 4, 4, and 9, and in 1946, 1, 1, 17, 5, 5, and 4, respectively. Of 95 infected trees 19 showed evidence of recovery from the disease. One of these became reinfected, but 12 were still standing in 1949. The failure of the disease to assume an epiphytotic form over the entire plot by 1946 is tentatively attributed to the intervention of natural factors.

Carranza (J. M.). **Antracnosis del Aguaribay causada par 'Myxosporella schini' sp. nov. en la Argentina.** [Anthracnose of the Pepper Tree caused by *Myxosporella schini* n. sp. in Argentina.]—*Rev. Fac. Agron., La Plata*, 27, 2, pp. 275–280, 8 figs., 1950. [English summary.]

A new disease of the pepper tree (*Schinus molle*) caused by *Myxosporella schini* n.sp. at La Plata and Chascomús (Buenos Aires), Argentina, is described. The branches and twigs of infected plants bear dark-coloured to black, somewhat depressed lesions, 1 to 2 mm. in length, gradually developing into white to pinkish, glistening cankers, ½ cm. by 3 to 4 mm., which may become confluent and induce cortical fissures. In severe cases the entire twig may be girdled and killed. The leaves display circular, light brown spots, 1 to 3 mm., with a dark brown border, sometimes coalescing and attaining a diameter of ½ cm. Cankers similar to, but smaller than those on the branches occur on the petioles and midribs and kill the leaves. Inoculation experiments on wounded and intact leaves, petioles, and shoots of *S. molle* resulted in the development of the typical anthracnose symptoms in the course of a month.

M. schini produces catenulate, ellipsoid, continuous, hyaline, biguttulate conidia, 5·5 to 11·1 by 0·7 to 1·8 μ, discharged in white cirrhi; they are borne on simple, hyaline, elongate, fasciculate conidiophores, 11·5 by 1·8 μ. The optimum temperature for growth on 2 per cent. potato dextrose and bean pod agars (the most

suitable media) was 18° C. In a 1 per cent. dextrose solution the conidia germinated in 48 hours.

KAUFERT (F. H.). **The preservative treatment of Aspen.**—*Pap. misc. J. Ser., Minn. agric. Exp. Sta.*, 623, 19 pp., 1948. [Mimeographed. Received December, 1950.]

In this report (No. 19 of the Lake States Aspen series) it is stated that most of the heart rot found in living aspen (*Populus tremuloides*), a tree of primary importance in 40 per cent. of the forest area of Michigan, Minnesota, and Wisconsin, is caused by *Fomes igniarius* [*R.A.M.*, 28, p. 552]. The fungi found on decaying aspen products include *Polyporus hirsutus*, *P. pergamenus* [ibid., 30, p. 353], *P. adustus*, *P.* [*Polystictus*] *versicolor*, *Poria* spp., *F. applanatus* [*Ganoderma applanatum*: ibid., 13, p. 604], *Pleurotus ostreatus*, and *Armillaria mellea* [ibid., 7, p. 606]. Heavy losses due to decay [ibid., 28, p. 41] may occur unless special precautions are taken.

Aspen products to be given preservative treatment with coal tar creosote or oil solutions of pentachlorophenol and copper naphthenate must be cleanly peeled, free from inner bark, and well air-seasoned. Sleepers, fence posts, mine timbers, and planks should be piled openly to promote rapid drying. Planking, sawn, incised, adzed, and bored sleepers, and sawn mine timbers can be readily treated with coal tar creosote by the empty-cell pressure treatment [ibid., 20, p. 99; 24, p. 348; 27, p. 51]. Similar results could probably be obtained with other preservatives. The limited experience of treatment by the hot-cold bath process [ibid., 28, p. 101] indicates that it gives fairly satisfactory treatment to sawn products and small, round fence posts, but that penetration may be patchy in large round products; only coal tar creosote and zinc chloride appeared to have been applied to aspen by this process, but it may be assumed that suitable oil solutions of pentachlorophenol and copper naphthenate would give similar results.

Green aspen fence posts and mine timbers have been treated with water-borne preservatives and proprietary compounds by the steeping, 'tire-tube', butt-soaking [ibid., 26, p. 274], and diffusion (steeping) processes and the records indicate that a service-life of at least ten years should be obtainable by these methods. Increased service can also be achieved by brush-coating dry aspen products with coal tar creosote or oil solutions of pentachlorophenol and copper naphthenate. Most of the published records indicate that aspen fence posts treated by the pressure or hot-cold bath methods have a service life of 20 years.

CAMPBELL (W. A.). **Vertical distribution of Phytophthora cinnamomi in the soil under littleleaf-diseased Shortleaf Pine.**—*Plant Dis. Reptr*, 35, 1, pp. 26–27, 1 graph, 1951. [Multilithed.]

In further soil samplings in February and March, 1949, at Athens, Georgia, to detect *Phytophthora cinnamomi* under short-leaf pine (*Pinus echinata*) infected with little leaf [cf. *R.A.M.*, 29, p. 187] the fungus was isolated from 26 per cent. of 372 samples [see above, p. 378] from 31 pits at depths of 1 to 12 in. It was most abundant at 2- and 3-in. depths, falling rapidly to a low point at 6 and 7 in., and again increasing in numbers at 8 and 9 in. It occurred to a limited extent even 12 in. deep.

VAKIN (A. T.) & SHTRAUKH (S. A.). О некоторых трутовиках на Кавказской Пихте (**Abies nordmanniana Link**). [Some bracket fungi on Caucasian Fir (*Abies nordmanniana* Link).]—*C. R. Acad. Sci. U.R.S.S.*, N.S., 73, 1, pp. 203–206, 3 figs., 1950.

During their work in 1947 and 1948 in the Teberdin and Caucasus State Forest Preserves and in the forests in the Stavropol and Krasnodar districts, the authors

studied the bracket fungi occurring on Caucasian fir (*Abies nordmanniana*) in mature and old stands. The most common species were *Fomes robustus* [*R.A.M.*, 15, p. 68], which is destroying the wood of trees 200 years old or over; *Polyporus berkeleyi* [ibid., 11, p. 680] at high altitudes, causing a root rot; and *P. dryadeus* [ibid., 9, p. 749; 11, p. 680], causing a rot of the roots and the lower trunk.

Lesser (M. A.). **Wood preservatives.**—*Soap*, 26, 11, pp. 114–115, 117, 119, 141, 1950.

In this useful review of recent developments in wood preservation, based on 37 contributions to the relevant literature, attention is drawn to the growing trend in the United States towards the application of protective treatments in the home, as well as in industry. Information is presented on the relation of humidity to fungal rotting, the damage caused by insects and decay, the advantages accruing from preservative treatment, methods of application, preservative standards, zinc chloride preservatives, pentachlorophenol, and the importance of solvent selection.

Narayanamurti (D.), Ranganathan (V.), Singh (R.), Chandrasekhar (T. R.), & Banerjee (A.). **Studies on coal tar creosote as a wood preservative. Part II. First interim report on creosotes of Indian origin.**—*For. Bull. Dehra Dun*, N.S., 144, 43 pp., 27 graphs, 1948 (issued 1950).

This is a detailed, tabulated account of work initiated in 1939 at the Forestry Research Institute, Dehra Dun, to evaluate Indian creosotes as wood preservatives [cf. *R.A.M.*, 21, p. 399]. The investigations took the form of laboratory analyses and experiments including toxicity tests, accelerated weathering tests [ibid., 29, p. 546], and the influence of various factors on the rate and manner of depletion of the preservative from treated timber; accelerated field tests similar to the sapling tests carried out by the Bell Telephone Laboratories [ibid., 14, p. 276], and normal service tests with sal (*Shorea robusta*) sleepers.

In the toxicity tests sal sapwood blocks were used with *Polystictus sanguineus* [ibid., 30, p. 88] as the test fungus. The results indicated that fractions with a low boiling point are not as highly toxic as supposed, and that probably it is unnecessary to specify any limits for tar acid content in creosote fractions.

In the tests of billets using the full cell, open tank, Lowry, and Rueping processes, 75 creosote: 25 fuel oil and 50/50 mixtures mostly gave the best results, thus permitting considerable latitude in creosote specifications. Unmixed heavier creosote also gave good results. With the open tank process where six creosotes and four creosote fractions were compared, it is significant that fraction H, which gave the best results in all cases (still fully effective after 315 to 316 weeks' service), also gave the lowest absorption figures. Creosotes C (the only one conforming to the American specification for brush and spray treatments) and D (American grade I) were next in order of effectiveness. Sapwood was much more highly absorptive than heartwood. The sleepers installed in the wet locality of Mailani and the dry locality of Muttra were still in a satisfactory condition after nine years' service. At Muttra the only rejections so far have been 1 per cent. of rectangular cross section sapwood sleepers treated with creosotes A (70 to 30 fuel oil) and AX (50/50), and 6 per cent. of boxed heartwood sleepers treated with creosotes A plus B with fuel oil (50/50), or AX plus BX (50/50), or fuel oil, alone. The half-round sleepers have needed no replacements. The heavier creosotes and fractions have so far proved more toxic and permanent.

Henderson (F. Y.). **Report of the Director of Forest Products Research for the year 1948.**—*Rep. For. Prod. Res. Bd, Lond., 1948*, pp. 4–40, 12 pl., 2 graphs, 1950.

In this report [cf. *R.A.M.*, 29, p. 593] it is stated that all the experimental,

pressure-creosoted, softwood sleepers laid on main-line railway tracks in 1935 [ibid., 17, p. 362] appeared to be free from decay in 1948. The results also showed that the usual method of creosoting Baltic redwood [*Pinus sylvestris*] sleepers is inadequate for the preservation of an absorbent timber such as beech, which must be completely penetrated. Other timbers, such as maritime and Corsican pine [*P. pinaster* and *P. nigra* var. *calabrica*], which contain a large proportion of permeable sapwood, also require much heavier impregnation than the normal if they are to give long service on the track.

Service tests on the durability of timbers used for marine work, in progress at Dover harbour for 15 years, were concluded. They confirmed the high natural durability of okan [*Cylicodiscus gabunensis*] and pyinkado [*Xylia dolabriformis*], but showed that well-creosoted softwood was as durable.

Further premature failures of pressure-treated timber in service were due to unsatisfactory creosoting originally, usually because of inadequate prior seasoning. That not one instance of failure of properly creosoted timber has been brought to notice emphasizes the importance of maintaining good treatment standards.

The sudden appearance of dry rot [*Merulius lacrymans* and *Coniophora puteana*: ibid., 25, p. 194] in houses after flooding is probably sometimes attributable to the revivification of incompletely eradicated mycelium dormant for many years [see above, p. 352]. Superficial sterilization of walls infested by *M. lacrymans* [ibid., 29, pp. 547, 594] does not always prevent the fungus from growing out again if dampness persists in the wall. Zinc oxychloride renderings have given very promising results [loc. cit.]. *M. lacrymans* was unaffected by very heavy doses of X-rays.

Some species, such as western red cedar (*Thuja plicata*) show considerable variation in different parts of the heartwood of resistance to [unspecified] decay [cf. ibid., 30, p. 206]. A preliminary experiment on Scots pine indicated that resistance may be higher in the outer heartwood than at the centre. If this should prove to be general, selection of samples for natural durability tests will have to take into account the position in the tree from which the samples were cut.

The staining organism most commonly identified in light-coloured hardwoods from tropical regions was a *Diplodia* species, possibly *D. natalensis*, which was responsible for extensive staining in several consignments of Venezuelan boxwood [*Gossypiospermum praecox*]. The logs were probably infected before shipment, and the application of an antiseptic immediately after felling would appear to be desirable. As boxwood must be dried slowly to avoid splitting it remains susceptible to blue stain longer than timbers that can be dried rapidly. Extensive decay [unspecified] in birch plywood frames bonded with urea formaldehyde resin was found in a number of wooden boats constructed during the war. Birch wood should always receive preservative treatment when it is to be used in damp situations.

HARROW (K. M.). **Toxicity of water-soluble wood-preservatives to wood-destroying fungi.**—*N.Z. J. Sci. Tech.*, B, 31, 5, pp. 14–19, 2 figs., 1950.

Tests were made at the Plant Diseases Division, Department of Scientific and Industrial Research, Auckland, New Zealand, of the toxicity of boric acid [*R.A.M.*, 29, p. 597], sodium fluoride [cf. ibid., 30, p. 296], tanalith [ibid., 29, p. 546], and zinc chloride [ibid., 29, p. 444] by the Leutritz method [ibid., 25, p. 588], using *Pinus radiata* blocks, and *Coniophora cerebella* [*C. puteana*] (N.Z. and Princes Risborough isolates), *Lenzites trabea* (Madison 617), and *Poria vaporaria* (Liese's strain). Salt loadings in the blocks were expressed as the percentage of dry salt in oven-dry wood, w/w. A toxicity index expressed the loss in weight by decay of the treated block as compared with that of the untreated from the same jar ranging from 100 for treated blocks with no rot to 0, when loss of weight in treated and untreated blocks was the same.

The results indicate that with the fungi and culture technique used the toxic loading of boric acid is between 0·5 and 0·9 per cent. (toxicity index 100 for all four fungus strains at 0·9), sodium fluoride about 1·04 per cent. (100 for all except *C. puteana* N.Z., 99·4), tanalith over 0·52 per cent. (100 for *P. vaporaria* only at this level), and zinc chloride about 2·16 per cent. (100 for all except *P. vaporaria*, 89·5) *L. trabea* was resistant to tanalith, 77·7 toxicity index occurring with 0·52 per cent. salt loading.

Verma (G. S.). **Soft rot of Radish (Raphanus sativus).**—Reprinted from *J. Madras Univ.*, 20, 16 pp., 2 pl., 1950.

Pythium aphanidermatum was proved by inoculation experiments to be the agent of a hitherto unrecorded soft rot of radish in the Lucknow district of India [cf. *R.A.M.*, 29, p. 597]. Associated with the fungus were two [unnamed] bacteria, which were, however, virtually innocuous to the host. Infection usually occurs through the tap-root at or near soil-level and is promoted by excessive humidity and a temperature ranging from 28° to 32° C.

Ernould (L.). **Les ennemis et maladies de la Betterave en Belgique, en 1950.** [Pests and diseases of Beet in Belgium in 1950.]—*Publ. Inst. belge Amélior. Better.*, 18, 5, pp. 179–190, 1950. [Flemish and English summaries.]

Virus yellows and leaf spot (*Cercospora beticola*) were the two principal diseases of beet in Belgium in 1950 [cf. *R.A.M.*, 30, p. 216], which was marked by abundant sunshine in June and July, with a high temperature in the former month, and abnormally heavy precipitation from July to September, the close of the period being cold as well. Virus yellows was observed as early as 24th June between Louvain and Vossem, infection having spread to the beet fields from neighbouring plots of winter spinach seed-bearers. In this region, as in the vicinity of Brussels, in Flanders, and in Tournai, the disease assumed a fairly severe form; in Tirlemont the damage was of moderate extent, and in Hesbaye infection developed late and was of little importance. Beet mosaic virus was also present in a number of places. *C. beticola* caused exceptionally heavy damage locally and reduced the sugar content.

The violet *Rhizoctonia* [root rot: *Helicobasidium purpureum*: ibid., 29, p. 343] was fairly prevalent in some fields. Lucerne, clovers, and potatoes should be excluded from the rotation on infested soils.

Hansen (H. P.). **Investigations on virus yellows of Beets in Denmark.**—*Trans. Dan. Acad. Tech. Sci., 1950*, 1, 68 pp., 6 graphs, 9 col. maps, 1950.

Since the publication of the author's previous paper, describing investigations on beet virus yellows in Denmark in 1946 [*R.A.M.*, 28, p. 104], two further extensive surveys were undertaken in 1947 and 1948. In all three seasons infection spread mostly between mid-June and early August, coinciding with the main period of activity of the aphid vectors, *Myzus persicae* and *Aphis fabae*. During the latter half of July and throughout August the development of the disease was rapid, but stabilization was reached by the beginning of September and maintained thereafter with little change. The aphid population may attain a new peak in the autumn, causing a further spread, which is not reflected to any extent in the current season's root crop but will become apparent in the next year's seed crop. Such was the case in 1948, following the long, mild autumn of 1947.

Detailed records of incidence each year in September point to beet seed fields as the principal foci of infection, clamps being of minor or no importance. A second year of seed crops in one area causes higher incidence in the locality. Since the virus may travel miles from the infection source (average about one mile), a given area can only be freed from contamination if seed fields are rigorously excluded over a radius of several kilometres.

In an experiment in 1947–8 with a 'shield culture' (previously designated 'covering crop' [loc. cit.]) of barley alternating with beet stecklings, the incidence of yellows was much lower (30 per cent.) and the seed yield 23 per cent. higher than in a plot without interspacing (81 per cent. infection). In other tests buckwheat and mustard proved almost equally effective with barley in the reduction of virus yellows infection. In 1948 the incidence of both yellows and beet mosaic virus was about 5 per cent. in 'shield culture' plots as compared with 24 per cent. in pure culture.

In laboratory experiments *M. persicae* and *A. fabae* on beet plants, *A. fabae* on twigs of *Euonymus* sp., and *M. ribis* on red currant leaves were killed in a few minutes by exposure to a temperature of 40° to 45° C. in a thermostat, the hosts being apparently uninjured. In an electric short-wave field the aphids died in a few seconds, suggesting the desirability of further studies on the possibilities of this method of combating pathogenic agents. The *Euonymus* leaves were destroyed instantaneously, but those of beet and currant did not appear to suffer unduly.

In varietal susceptiblity tests in 1946 and 1947 Gul Øtofte fodder beet and Øtofte Nova mangold (Barres Øtofte × Gul Øtofte) were the most consistently resistant under all prevailing conditions.

WARK (D. C.). **The inheritance of resistance to Ascochyta pisi Lib. in Pisum sativum L.**—*Aust. J. agric. Res.*, 1, 4, pp. 382–390, 1 pl., 1950.

Ascochyta blight caused by *Mycosphaerella pinodes*, *A. pisi*, and *A. pinodella* does considerable damage to garden peas in Australia [*R.A.M.*, 30, p. 91]. A search for resistance to *A. pisi* was made at Canberra, inoculated plants being rated on a scale from 0 (no symptoms) to 5 (majority of plants killed completely). No variety was as resistant as Austrian Winter (rated 1) while 166 were rated at 2, 116 at 3, 30 at 4, and 1 (a strain of William Massey) at 5.

The resistance of Austrian Winter was transmitted in most crosses with susceptible varieties. Segregation in the F_2 and later generations indicated that resistance was due to a combination of three dominant Mendelian factors. Several Austrian Winter hybrids were shown to possess considerable field resistance to *A. pisi* at Warncoort, Victoria, under conditions favourable for infection. Four lines showed no infection compared with 90 per cent. on Greenfeast. They all inherited some undesirable plant characteristics from the Austrian Winter parent.

In an appendix all the varieties used in the investigations are listed according to their susceptibility.

CRUICKSHANK (I. A. M.). **Studies on a fungus (Septoria pisi Westend.) causing a foliage disease of Peas (Pisum sativum L.).**—*N.Z. J. Sci. Tech.*, A, 31, 3, pp. 17–23, 5 figs., 1949. [Received January, 1951.]

In 1946–7 field peas at Lincoln, Canterbury, New Zealand, were infected by *Septoria pisi*, not previously recorded in New Zealand [see above, p. 361]; the disease appears to be present throughout the Dominion. Colonies on vegetable extract agar were campanulate, while on Czapek's sucrose agar growth was mainly submerged. Most colonies were olive green, but those on bean extract were dark brown and on potato plugs white. Growth was slow and sporulation very tardy. The pycnidia were 79 to 237 μ in diameter, with a wall composed of loosely interwoven hyphae, and a wide, ill-defined ostiole. The cylindrical, straight or irregularly curved, 1- to 3-septate spores measured 24·5 to 59 by 3 to 3·5 μ. The wall formation and ill-defined ostiole together with spores of even septation suggest that *S. pisi* may more correctly belong to *Phleospora*. The fact that pycnidia were present on both stems and leaves supports the view that *S. pisi* is identical with *Rhabdospora hortensis* [ibid., 18, p. 413].